



CELMA

*Federation of National Manufacturers Association for
Luminaires and Electrotechnical Components for
Luminaires in the European Union*

**CELMA Guide for the application of the Commission Regulation 245/2009 on
“Tertiary lighting sector products”
(Ecodesign requirements for
fluorescent and high intensity discharge lighting products)**

**1st Edition
FINAL VERSION 06/11/2009**

**COMMISSION REGULATION (EC) 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, and repealing Directive
2000/55/EC of the European Parliament and of the Council***

**1st Edition
November 2009**

Remark for the 1st edition of the CELMA Guide:

The Regulation 245/2009 covers tertiary lighting sector products meaning lamps, ballasts and luminaires. The 1st edition of the CELMA Guide contains information about ballasts and luminaires. The lamp details are not included because an amendment of the Regulation 245/2009 is ongoing and will lead to an update of the regulation with many changes for the lamps. Please contact your lamp suppliers to clarify which of their lamps may be affected by the different stages of this regulation, based upon their published values.

PREFACE

CELMA is the Federation of National Manufacturers Associations for luminaires and electrotechnical components for luminaires in the European Union. CELMA has 19 member Associations and represents over 1,000 companies in 13 European countries. These producers, which include a majority of small and medium-sized companies, directly employ 107,000 people and generate more than 15 billion Euros annually.

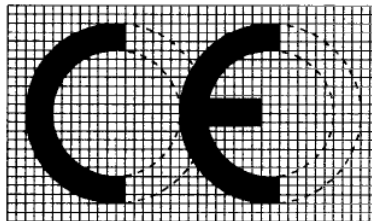
This CELMA Guide is intended to help the market understanding the complex Commission Regulation of 18 March 2009 (EC) No. 245/2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps, and repealing Directive 2000/55/EC of the European Parliament and of the Council. The information provided in this Guide is the interpretation of the Regulation as understood by CELMA members.

The Regulation for tertiary sector lighting products is a product related regulation which is application independent and addresses specific products, such as fluorescent lamps without integrated ballast, high intensity discharge lamps and ballasts and luminaires able to operate such lamps.

Mandatory ecodesign requirements (as set up in the “EuP” Directive 2005/32/EC establishing a framework for the setting of ecodesign requirements for energy-using products) apply to products placed on the market wherever they are installed. Such requirements can therefore not be made dependent on the application in which the product is used (such as office or street lighting).

Products subject to this Regulation are meant to be used essentially for general lighting purposes, meaning that they contribute to the provision of artificial light replacing natural light for the purposes of normal human vision. Special purpose lamps (such as lamps used in computer screens, photocopiers, tanning appliances, terrarium lighting and other similar applications) are not part of this Regulation.

Products bearing the CE marking have to fulfil the requirements of this Regulation.



SUMMARY OF REQUIREMENTS AS GIVEN IN REGULATION 245/2009

The requirements are basically for general lighting and include all fluorescent lamps without integrated ballasts and all high intensity discharge (HID) lamps, ballasts and luminaires for these lamps.

There are 3 main stages and 2 intermediate stages, where in each stage, requirements are defined.

Timetable of the different stages

STAGE 1 (1 year after entry into force)	13.04.2010
Intermediate stage (18 months after entry into force)	13.10.2010
STAGE 2 (3 years after entry into force)	13.04.2012
Intermediate stage (6 years after entry into force)	13.04.2015
Stage 3 (8 years after entry into force)	13.04.2017

No later than 5 years after the entry into force (13 April 2014) the Regulation shall be reviewed by the Commission in view of the progress of the lighting technology.

Ballasts

Fluorescent Lamp Ballasts

This Regulation is a prolongation of the Directive 2000/55/EC (the Ballast Directive) on energy efficiency requirements for ballasts for fluorescent lighting ("Ballast Directive") which is repealed by this Regulation. The difference is that the EEI (Energy Efficiency Index) is not based on the system power (as it was in the Ballast Directive), but on the ballast efficiency; so lamp power divided by system power.

In the **first stage (13.04.2010)** the requirements are equal to the ones from the Ballast Directive, only a conversion has taken place from system power to ballast efficiency. The measuring methods are still the same. Additional requirements are:

- **Standby losses less or equal to 1 W per ballast**
- **Ballasts for current lamps in the market shall fulfil at least EEI=B2 requirements**
- **For new lamps not designed for current ballasts the efficiency requirements for ballasts are: class A3 (see Annex C.2.2) (eff. min= $0,94 * P_{lamp} / (2 * \sqrt{P_{lamp} / 36} + 38 / 36 * P_{lamp} + 1)$)**

In the **second stage (13.04.2012)** the requirements for standby losses are stricter:

- **Less or equal to 0.5 W per ballast**

In the **third stage (13.04.2017)** the requirements for non dimmable ballasts are:

- **A2 or A2 BAT (Best Available Technology)**

and for dimmable ballasts:

CELMA EcoDesign (NW)003B_CELMA Guide on EuP Tertiary Lighting Regulation_1st Edition_06112009_FINAL.doc

- A1 BAT

HID Lamp Ballasts

In the **first stage (13.04.2010)** no requirements are defined.

In the **second stage (13.04.2012)** introduction of minimum ballast efficiency demands and the obligation to make them available either as a mark on the ballast or in the documentation. Marking the ballasts fulfilling requirements with:

- EEI=A3

In the **third stage (13.04.2017)** introduction of more strict efficiency requirements for the ballasts, marking with:

- A2

With the marking requirements (fluorescent and HID lamp ballasts) for example of EEI=A3 or A2 there is an identification if the ballasts fulfil the requirements regarding the stages 1 and 2 (EEI=XX) or the stage 3 (without EEI=).

Luminaires

In the **first stage (13.04.2010)** the standby losses of the luminaires for fluorescent lamps are equal to the sum of the number of ballasts incorporated, neglecting other components inside the luminaire which may use power. So the standby losses are less than n Watt, whereby n is the number of built in ballasts.

Intermediate stage: 18 months after the entry into force of this Regulation (from 13.10.2010 onwards), the luminaire manufacturers have to provide mandatory product information for fluorescent and High Intensity Discharge (HID) lamps (> 2000 lumen) on their website and technical documentation. The declaration of conformity shall contain the elements specified in Annex VI of the EuP Directive and the following points:

- Efficiency of the ballast. For example, EEI=A2 (according information from the ballast producer)
- Lamp efficacy (lumen/Watt). For example colour 840 = 90 lm/W.
- Maintenance instructions to ensure that the luminaire maintains, as far as possible, its original quality throughout its lifetime. For example cleaning instructions.

In the **second stage (13.04.2012)** a design requirement for both fluorescent and HID lamp luminaires is introduced. The luminaire must be designed so that it is suitable for stage 3 ballasts; this is in order to have a changeover in the third stage without delay.

CELMA recommends switching to stage 3 ballasts (A1 BAT, A2 and A2 BAT) as soon as possible (including luminaires for IP4X).

The standby losses for luminaires for fluorescent lamps shall be less or equal to $n/2$ Watt, whereby n is the number of built in ballasts. (Again neglecting other power consuming of components inside the luminaire).

In the **third stage (13.04.2017)** the luminaires for fluorescent or HID lamps may only use ballasts of the third stage.

Overview of the main requirements

		Fluorescent lighting solutions	High-intensity discharge lighting solutions
Stage 1 from 13.04.2010	Ballasts	Non dimmable ballasts: minimum EEI = B2 Dimmable ballasts: minimum EEI = A1 Standby losses ≤ 1 W Non dimmable ballasts for new lamps which are not designed for existing ballasts: minimum EEI = A3 Marking requirements for ballasts mandatory. For example EEI = A2	No special requirements
Intermediate stage from 13.10.2010	Luminaires	Luminaire standby losses values = sum of ballast limit values (number of ballasts installed) After 18 months: Technical information must be provided on websites and in the documentation for luminaires > 2,000 lumen.	
Stage 2 from 13.04.2012	Ballasts	Standby losses $\leq 0,5$ W	Introduction of efficiency limit values for HID ballasts. The energy efficiency of all HID ballasts must be indicated, e.g.: $\eta = 78$ %. Marking on the ballasts with EEI=A3
	Luminaires	Luminaire standby losses values = sum of ballast limit values (number of ballasts installed) Luminaires must be compatible with stage 3 ballasts, except for luminaires \geq IP4X.	Technical information must be provided on websites and in documentation for luminaires > 2,000 lm.
13.04.2014 at the latest	<h3 style="margin: 0;">Review of the Regulation</h3>		
Stage 3 from 13.04.2017	Ballasts	$\eta_{\text{ballast}} \geq \text{EBb}_{\text{FL}}$ (new ballast limit value formula): Where $P_{\text{lamp}} \leq 5$ W: $\text{EBb}_{\text{FL}} = 0.71$ Where $5 \text{ W} < P_{\text{lamp}} < 100$ W: $\text{EBb}_{\text{FL}} = P_{\text{lamp}} / (2 * \sqrt{P_{\text{lamp}} / 36} + 38 / 36 * P_{\text{lamp}} + 1)$ Where $P_{\text{lamp}} \geq 100$ W: $\text{EBb}_{\text{FL}} = 0.91$ corresponds to phasing out of EEI = A3, B1 and B2 (<i>mag. ballasts may be realised for higher wattages – permissible classes are A2, A2 BAT and only A1 BAT for dimmable ballasts</i>) Marking on the ballasts only with A2, A2 BAT or A1 BAT .	Higher limit values than in stage 2: $P < 30$ W – $\eta \geq 78\%$ $30 < P < 75$ W – $\eta \geq 85\%$ $75 < P < 105$ W – $\eta \geq 87\%$ $105 < P < 405$ W – $\eta \geq 90\%$ $P > 405$ W – $\eta \geq 92\%$ The energy efficiency of all HID ballasts must be indicated, Marking on the ballasts with A2

	Luminaires	All luminaires must be compatible with stage 3 ballasts.	All luminaires must be compatible with stage 3 ballasts.
--	-------------------	---	---

CELMA RECOMMENDATIONS

Recommendations with respect to ballasts

- CELMA recommends to switch to stage 3 ballasts (A1 BAT, A2 and A2 BAT) as soon as possible (including luminaires for IP4X).
- For luminaires for higher ambient temperatures or for robust operation, CELMA recommends the luminaires manufacturers to contact the ballast manufacturers to clarify the technical solution (magnetic ballasts or electronic ballasts which are fulfilling the energy efficiency requirements) for such kind of luminaires.

Recommendations with respect to luminaires

- Although ballasts for fluorescent applications with the energy classification EEI=B1 or B2 not be banned sooner than at stage 3, CELMA recommends the luminaires manufacturers to use stage 3 ballasts (A1 BAT, A2 and A2 BAT) as soon as possible.
- Also A3 ballasts will be banned in stage 3. Therefore CELMA also recommends the luminaires manufacturers to use stage 3 ballasts (A1 BAT, A2 and A2 BAT) as soon as possible.

Recommendations with respect to benchmarks

- CELMA does not recommend using the proposed indicative benchmarks in the Annexes V, VI and VII of the Regulation. The reason is that these indicative benchmarks could hamper the free circulation of lighting products on the market as they could be made mandatory for specific uses (such as public procurement building regulations, etc) by some EU Member States only.

Table of contents for the annexes

Annex A: Regulation Introduction

- A.1 Basis: The EuP Framework Directive
- A.2 Placing on the market
- A.3 CE marking requirements
- A.4 Standards
- A.5 EC declaration of conformity

Annex B: Lamp requirements - Not included in the first edition of the guide!

Annex C: Ballast requirements

- C.1 Introduction
- C.2 Ballasts for fluorescent lamps
- C.3 Ballasts for high intensity discharge lamps
- C.4 Indicative benchmarks for ballasts
- C.5 Ballast Market for fluorescent lamps in Europe
- C.6 Ballast Market for HID lamps in Europe

Annex D: Luminaire requirements

- D.1 Introduction
- D.2 Exemptions
- D.3 Energy efficiency requirements for luminaires
- D.4 Product information requirements
- D.5 Indicative benchmarks for luminaires

Annex E: Market surveillance

- E.1 Verification procedure for market surveillance

Annex A Regulation Introduction

A.1 Basis: The EuP Framework Directive

The [Directive 2005/32/EC](#) establishing a framework for the setting of ecodesign requirements for energy-using products (EuP) defines the general statutory conditions for promoting the integration of environmental aspects into the development and design of energy-using products and thus improving the environmental impacts of those products, especially their energy efficiency.

The Framework Directive itself is not directly effective. The specific requirements that products need to be met are defined in "implementing measures", such as this Regulation for Tertiary Lighting products.

A.2 Placing on the market

Article 2, paragraph 4 of the EuP Framework Directive (2005/32/EC) defines "placing on the market" as making an EuP available for the first time on the Community market with a view to its distribution or use within the Community whether for reward or free of charge and irrespective of the selling technique. For full details refer to the Commission "Guide to the implementation of Directives based on the New Approach and the Global Approach (Blue Guide)".

A.3 CE marking requirements

The CE marking requirements are set out in Article 5, paragraph 2 of the EuP framework directive as well as in Annex III.

The CE marking must be affixed on the luminaire, the ballast and the lamp.

In case of **luminaires**, the following EU legislations must be fulfilled in future for the application of the CE marking:

- **Low Voltage Directive 2006/95/EC**
- **EMC Directive 2004/108/EC**
- **Regulation No. 245/2009 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, and repealing Directive 2000/55/EC

In case of **ballasts**, the following EU legislations must be fulfilled in future for the affixing of the CE marking:

- **Low Voltage Directive 2006/95/EC**
- **Regulation No. 245/2009 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, and repealing Directive 2000/55/EC

Ballast Directive 2000/55/EC is repealed by this Regulation!

In the CE declaration of conformity, the manufacturer must confirm that these EU legislations must be fulfilled.

A.4 Standards

Where an EuP is manufactured in accordance with harmonised standards, the reference numbers of which have been published in the Official Journal of the European Union, it is presumed that that EuP conforms to the essential requirements of the relevant legislations.

A.5 CE declaration of conformity

After placing an EuP on the market, the manufacturer or its authorised representative must keep relevant documents relating to the conformity assessment and EU declarations of conformity for inspection by the Authorities for a period of **ten years** after the last of that EuP has been manufactured. Where the manufacturer is not established within the European economic area and in the absence of an authorised representative, the obligation lies with the importer.

The EC declaration of conformity must contain the following elements:

- a) the name and address of the manufacturer or of its authorised representative;
- b) a description of the model sufficient for unambiguous identification;
- c) where appropriate, the references of the harmonised standards applied;
- d) where appropriate, the other technical standards and specifications used;
- e) where appropriate, the declaration of compliance with other relevant Community legislation providing for the affixing of the CE marking;
- f) identification and signature of the person empowered to bind the manufacturer or its authorised representative.

Annex B

Lamp requirements

Regulation 245/2009 covers product manufactured for the tertiary lighting sector. This includes lamps, ballasts and luminaires.

The 1st CELMA Guide contains information about ballasts and luminaires only.

The lamp details are not included because an amendment is under discussion which can lead to an update of the regulation; therefore it is not appropriate to discuss the lamps at this stage.

In the meantime, please contact your lamp suppliers to clarify which of their lamps may be affected by the different stages of this Regulation.

Annex C Ballasts requirements

C.1 Introduction

Lamp ballasts determine the operating point of the lamps and thus affect the efficiency of the ballast/lamp system. The energy efficiency and marking requirements of Regulation 245/2009 allows a sustainable energy-conscious choice of ballasts taking account the technical requirements and environmental conditions of the relevant application. Since luminaires are normally sold with ballasts built-in, the choice of ballast is primarily a matter for the luminaire manufacturer, who has to consider the requirements of designers, architects, clients and installers during the design of their luminaires.

Regulation 245/2009 prescribes energy efficiency and product information requirements. The requirements prescribed for ballasts for fluorescent lamps are different from those for ballasts for high intensity discharge lamps.

Where there is the possibility of different lamps being operated by a single ballast (**multi-power ballast**), the requirements apply to each individual lamp type and the information must be declared on the ballast or in the documentation for each individual lamp. Where only one declaration is made (collective declaration), the value declared must be the least favourable values ones.

In the case of **multi-lamp ballasts** (e.g. 4 x 14 W T5 lamps), the energy efficiency requirements for the ballast is equal to the requirement for a single lamp ballast, so equal to four times 1 x 14 W T5.

One year after entry into force of this Regulation, the previous Directive 2000/55/EC will be withdrawn, i.e. on 13.04.2011.

Please note that emergency lighting luminaires are exempted from this Regulation. By mistake, this Regulation is not exempting the emergency lighting ballasts. Therefore CELMA has requested an amendment of this Regulation to add ballasts for emergency lighting on the exemption list as soon as possible.

Luminaires for special operation conditions such as higher ambient temperatures (above 25°C) or mechanical vibrations do require special ballasts for these purposes. CELMA recommends the luminaire manufacturers to contact the ballasts producers to clarify the technical solution (magnetic ballasts or electronic ballasts which are fulfilling the energy efficiency requirements) for such kind of luminaires.

Table C.1 provides an overview of the ballast requirements for the three implementation stages of Regulation 245/2009.

Table C.1 – Implementation stages and ballast requirements

		Stage 1 from April 2010	Stage 2 from April 2012	Stage 3 from April 2017
Fluorescent lamp ballasts	Standard ballasts	At least EEI = B2 for existing ballast/lamp systems and at least EEI = A3 for new lamps systems		A2 BAT and A2 based on limit value formulas
	Dimmable ballasts	At least EEI = A1		A1 BAT based on limit value formulas
	Standby losses	≤ 1 W per ballast	≤ 0,5 W per ballast	
	Product information	EEI classification: ballast, websites and technical documentation		Classification according to limit value formulas: ballast, websites and technical documentation
High intensity discharge lamp ballasts	Standard ballasts	-	Minimum efficiency $\eta_{ballast}$, marking EEI = A3	Minimum efficiency $\eta_{ballast}$, marking A2
	Dimmable ballasts	-	-	-
	Standby losses	-	-	-
	Product information	-	Indication of $\eta_{ballast}$: ballast, websites and technical documentation	Indication of $\eta_{ballast}$: ballast, websites and technical documentation

C.2 Ballasts for fluorescent lamps

C.2.1 Ballast energy performance requirements for normal operation

Under Directive 2000/55/EC, ballasts were assessed on the basis of the overall input power of fluorescent lamp circuits. Under the new Regulation 245/2009 the basis for assessing ballasts for fluorescent lamps has changed from overall system input power to ballast efficiency.

Ballast efficiency is the quotient of the lamp output power and the total input power of the lamp-ballast circuit. The total input power of the fluorescent lamp circuit is measured in accordance with EN 50294 (Measurement method of total input power of ballast-lamp circuits) and calibrated to meet specific requirements regarding reference conditions ($P_{tot.ref.}$). Measuring/calculating the total input power of fluorescent lamp circuits takes into account the luminous flux behaviour of the lamps when operated by electronic ballasts.

In EN 50294, total input power with electronic ballasts is calculated on the basis of formula 1:

$$[1] \quad P_{tot.ref.} = P_{tot.meas.} \times \frac{P_{Lnom.}}{P_{Lref.meas.}} \times \frac{Light_{ref.}}{Light_{test}}$$

To ascertain the efficiency of an electronic ballast $\eta_{ballast}$, the lamp output power $P_{Lnom.}$ is divided by the total input power $P_{tot.ref.}$.

$$[1a] \quad \eta_{ballast} = \frac{P_{Lnom.}}{P_{tot.ref.}} = \frac{P_{Lref.meas.}}{P_{tot.meas.}} \times \frac{Light_{test}}{Light_{ref}}$$

Where:

$P_{tot.ref.}$	total input power of the ballast-lamp circuit under test correlated to comparable reference conditions (in Watt)
$P_{tot.meas.}$	measured total input power into the ballast-lamp circuit under test (in Watt)
$P_{Lnom.}$	rated lamp or typical HF power of relevant reference lamp according to the lamp data sheet (in Watt)
$P_{Lref.meas.}$	measured lamp power in the circuit with reference ballast (in Watt)
$Light_{ref.}$	light output of the reference lamp connected to reference ballast measured by photocell meter reading
$Light_{test}$	light output of the reference lamp connected to the test ballast measured by photocell meter reading

Remark: The expression P_{Lnom} is in line with EN 50294 and indicates the rated lamp or typical HF power of the relevant reference lamp but not its nominal value. For T5 lamps the typical lamp power at 35°C is being used.

Total input power with magnetic ballasts is calculated on the basis of formula 2:

$$[2] \quad P_{tot.ref.} = P_{tot.meas.} \left(\frac{P_{Lref.meas.}}{P_{Lmeas.}} 0,95 \right) - (P_{Lref.meas.} - P_{Lnom.})$$

Applying a factor of 0.95 takes account of the characteristics of a lamp operated by magnetic ballast. This factor must also be applied when calculating magnetic ballast efficiency.

So to calculate the efficiency $\eta_{ballast}$ of magnetic ballast, the lamp output power P_{Lnom} is multiplied by the factor 0.95 and divided by the total input power $P_{tot.ref.}$.

$$[2a] \quad \eta_{ballast} = 0,95 \frac{P_{Lnom.}}{P_{tot.ref.}} = 0,95 \frac{P_{Lnom.}}{P_{tot.meas.} \left(\frac{P_{Lref.meas.}}{P_{Lmeas.}} 0,95 \right) - (P_{Lref.meas.} - P_{Lnom.})}$$

Where:

$P_{Lmeas.}$ measured lamp power in the circuit with test ballast (in Watt)
 $P_{Lnom.}$ rated lamp power (50 Hz) of relevant reference lamp according to the lamp data sheet (in Watt)

The standard mains electricity supply voltage across the EU is 230 V, so measurements and calculations are performed on the basis of this line voltage. 230 V is being adopted as the nominal voltage in a growing number of countries worldwide (e.g. Australia, India, etc.).

Once ballast efficiency has been measured/calculated, ballasts can be given an energy efficiency class and marked accordingly.

Stage 1 (13.04.2010) – one year after the Regulation enters into force

Table C.2 is taken from Regulation 245/2009 and shows the efficiency and EEI classes of ballasts designed to operate the different lamp types listed. The ballast efficiency classes shown are based on the limit values for total input power applied in the CELMA energy efficiency classification system.

What is new in the table is the class A2 BAT (BAT = **B**est **A**vailable **T**echnology), which is reserved for devices achieving state-of-the-art efficiency. The idea of introducing A2 BAT is to create scope for raising requirements at a later date.

**Table C.2 – Requirements for non-dimmable ballasts for fluorescent lamps
(Table 17 of the Regulation)**

LAMP DATA					BALLAST EFFICIENCY (P_{lamp} / P_{input})				
Lamp type	Nominal wattage W	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2
			50Hz	HF					
			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-l-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-l-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-l-G24d=2	18	16.5	89,8 %	86,8 %	78,6 %	71,3 %	65,8 %

LAMP DATA					BALLAST EFFICIENCY (P_{lamp} / P_{input})				
Lamp type	Nominal wattage	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2
			50Hz	HF					
	W		W	W	W				
TC-D / DE	26	FSQ-26-E-G24q=1 FSQ-26-I-G24d=1	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-GR10q FSS-10-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-I-GR10q FSS-21-L/P/H-GR10q	21	19	89,4 %	86,4 %	79,2 %	73,9 %	68,8 %
TC-DD / DDE	28	FSS-28-E-GR10q FSS-28-I-GR10q FSS-28-L/P/H-GR10q	28	26	89,7 %	86,7 %	81,3 %	78,2 %	73,9 %
TC-DD / DDE	38	FSS-38-E-GR10q FSS-38-L/P/H-GR10q	38.5	36	92,3 %	90,0 %	85,7 %	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 %		

LAMP DATA					BALLAST EFFICIENCY (P_{lamp} / P_{input})				
Lamp type	Nominal wattage	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2
			50Hz	HF					
	W		W	W	W				
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-GR10q		55	92,4 %	90,2 %	84,6 %		

Remarks: The higher efficacy achieved by fluorescent lamps in High Frequency (HF) operation is not taken into account here. Thus this table gives no indication to compare the overall efficiency of magnetic and electronic (HF) operated fluorescent lamps on a system level.

Stage 2 (13.04.2012) – three years after the Regulation enters into force:

No additional requirements are set out for normal operation in stage 2.

Stage 3 (13.04.2017) – eight years after the Regulation enters into force:

In stage 3, Regulation 245/2009 requires that ballasts should conform to the efficiency limit values of the formulas 3, 4 and 5.

Table C.2 will lose its validity in stage 3 and ballasts will no longer be classified according to the values shown in it.

FL-Ballasts have to fulfil the requirements of the formula:

$$\eta_{ballast} \geq EB_{bFL}$$

Where:

$$\begin{aligned}
 [3] \quad Ebb_{FL} &= 0.71 && \text{for } P_{lamp} \leq 5 \text{ W} \\
 [4] \quad Ebb_{FL} &= \frac{P_{lamp} \text{ (in Watt)}}{2\sqrt{\frac{1}{36} P_{lamp} \text{ (in Watt)} + \frac{38}{36} P_{lamp} \text{ (in Watt)} + 1}} && \text{for } 5 \text{ W} < P_{lamp} < 100 \text{ W} \\
 [5] \quad Ebb_{FL} &= 0.91 && \text{for } P_{lamp} \geq 100 \text{ W}
 \end{aligned}$$

EBbFL “Efficiency Base ballast” means the relationship between the rated lamp power P_{lamp} ($= P_{Lnom.}$) and the ballast efficiency ($= P_{Lnom.}$) is the rated lamp (or typical HF) power of relevant reference lamp according to the lamp data sheet (in Watts)

Remark: P_{Lnom} indicates the rated or typical HF-Power of the lamp measured at the rated ambient temperature. For T5-E and T5-C lamps the typical lamp power is measured at 35°C

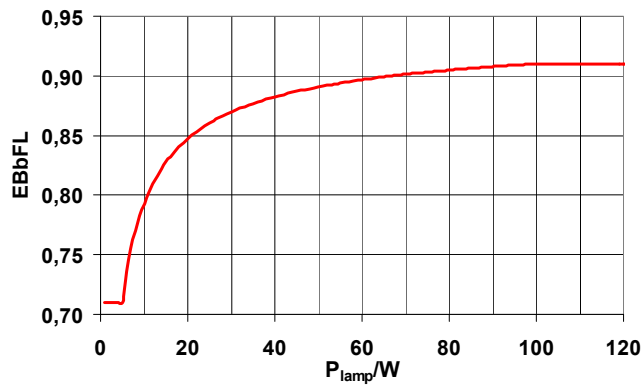


Figure C.1 – EBbFL “Efficiency Base ballast” according to the lamp power

Calculation examples based on formula 4:

A) **Sample magnetic ballast** for a 36 W T8 lamp with a total input power $P_{tot.ref.}$ of 38,7 W ($P_{lamp} = 36$ W):

- Efficiency limit value from formula 4: $Ebb_{FL} = 87,8 \%$
- Sample ballast efficiency $\eta_{ballast} = 36 \text{ W} * 0,95/38,7 \text{ W} = 88,4 \%$

This sample magnetic ballast meets the efficiency requirements of formula 4 with the ballast losses only around 4,5 W. This loss is approx. 30 % lower than the values of conventional EEI=B1 ballasts today meaning that such a ballast could only be used for special applications and is not a conceivable option for normal applications.

B) **Sample electronic ballast** for a 36 W T8 fluorescent lamp with a total input power of 38 W ($P_{lamp} = 32$ W):

- Efficiency limit value from formula 4: $Ebb_{LL} = 87,3 \%$
- Sample ballast efficiency $\eta_{ballast} = 32 \text{ W}/38 \text{ W} = 84,2 \%$

This sample electronic ballast does not meet the efficiency requirements of formula 4; the approx. 6 W power loss puts it below the calculated limit value.

C) **Sample electronic ballast** for two 54 W fluorescent lamps with a total input power $P_{tot.ref.}$ of 114,5 W ($P_{lamp} = 53,8$ W for each lamp):

- Efficiency limit value from formula 4 ($P_{lamp} = 53,8$ W): $EBb_{LL} = 89,3$ %
- Sample ballast efficiency $\eta_{ballast} = 2 * 53,8$ W/114,5 W = 94 %

Please note that this ballast can be indicated to meet ballast efficiency class A2BAT (EBbFL) which requires a minimum efficiency of 92 % at $P_{lamp} = 53,8$ W (see Annex C.2.5)

C.2.2 Ballast energy performance requirements for normal operation of new lamp systems not yet available in the market

When new lamp systems are introduced, the ballasts for the lamps must be classified in accordance with Table C.3.

Table C.3 – Requirements for non-dimmable ballasts for lamps not included in Table C.2 (Table 18 of the Regulation)

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

C.2.3 Ballast energy performance requirements for normal operation of dimmable systems

Along with A2 BAT, the Regulation also defines A1 BAT for dimmable systems. The requirements are shown in Table C.4.

In the case of dimmable ballasts, the input power of the system must not exceed $P_{in} < 0,5 P_{Lnom}/\eta_{ballast}$ at "25 % lumen output". P_{Lnom} is the rated lamp power of the system used.

Table C.4 – Requirements for dimmable ballasts for lamps (Table 19 of the Regulation)

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

C.2.4 Energy performance requirements for standby operation (dimmable and non-dimmable systems)

Sensors and other network connections are not taken into account for the standby operation of fluorescent lamp ballasts, i.e. they are not connected for measurement. For ballasts with a combined function for maintained mains and emergency operation, the battery is dis-connected (under consideration in consultation with commission).

In stage 1, a limit value of 1 W per ballast is defined. In stage 2, that value is reduced to 0,5 W.

Please note that ballasts which have automatically shut down after fault detection are not regarded as operating in standby mode.

C.2.5 Indication of the energy efficiency of fluorescent lamp ballasts

Ballast efficiency classes are indicated in documentation and on rating plates as follows:

A) Indication based on Table C.2 values (stages 1 and 2):

EEI = A1, EEI = A2, EEI = B1, EEI = B2

This marking shows that the ballast complies with the energy efficiency requirements in Table C.2, i.e. the stage 1 and 2 stipulations of the Regulation for fluorescent lamp ballasts. Information on standby losses is contained in the technical documentation.

B) Indication based on formula 3, 4 and 5 requirements (stage 3):

A2 or A2 BAT

This marking shows that the ballast complies with the energy efficiency requirements based on the limit value formulas, i.e. the stage 3 requirements for ballasts. Information on standby losses is contained in the technical documentation.

Table C.5 – Classification of fluorescent lamp ballasts according to stage 3

η_{ballast}	Energy Efficiency Index
$\geq \text{EBb}_{\text{FL}}$	A2 A1BAT
$\geq 1-0,75*(1-\text{EBb}_{\text{FL}})$	A2 BAT

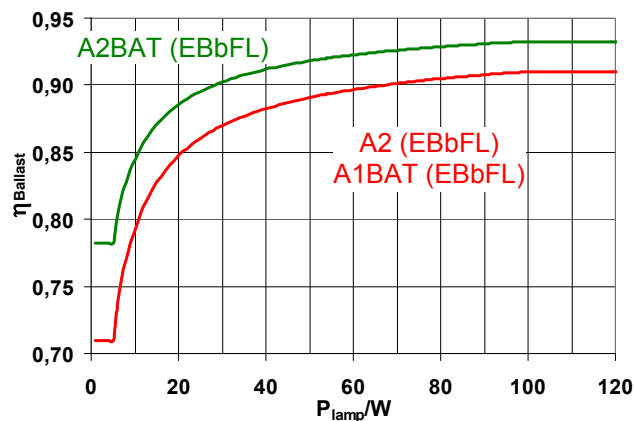


Figure C.2 – Ballast efficiency requirements vs. lamp power for efficiency classes A2 (EBbFL), A2 BAT (EBbFL) and A1 BAT (EBbFL)

The Figure C.3 shows the possible marking of ballasts and the use on luminaires.

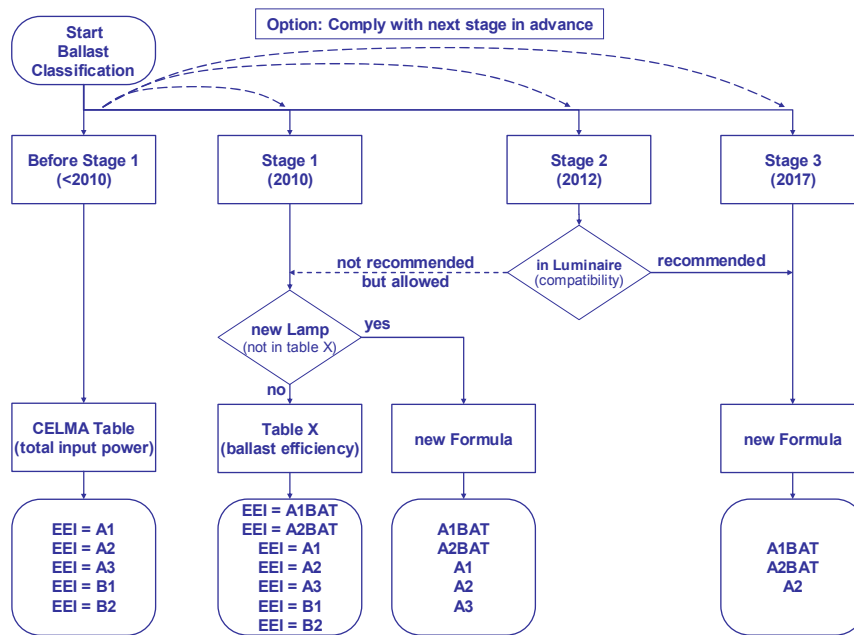


Figure C.3 – Ballast efficiency classification overview

Remarks: Ballasts fulfilling the requirements of a later stage before it becomes mandatory should be marked according to the requirements of the later stage only.

C.2.6 Product information requirements for fluorescent lamp ballasts

Table C.6 shows the overview of product information which should be provided from the manufacturer.

Table C.6 – Product information FL-Ballasts

	Stage 1 from 13.04.2010	Stage 2 from 13.04.2012	Stage 3 from 13.04. 2017
On ballast	Indication of energy efficiency index (e.g. EEI = A2 BAT, EEI = A2, EEI = B1 or EEI = B2)		Indication of energy efficiency index based on limit value formulas (e.g. A2 BAT (EBbFL) or A2 (EBbFL))
Free-access website			
Technical documentation			

C.3 Ballasts for high intensity discharge lamps

C.3.1 Energy performance requirements for normal operation

Regulation 245/2009 rates the efficiency of ballasts for high intensity discharge lamps and specifies minimum values for it.

Efficiency is lamp output power divided by total input power. The measurement method required for rating efficiency is currently (at the moment of publishing this document) standardised within International Electrotechnical Commission (IEC) and may be used for either electronic or magnetic ballasts for high intensity discharge lamps. The ballast to be rated is connected to an equivalent circuit and measured. To establish its efficiency, the measured or calculated lamp power is then divided by the total input power of the measuring circuit.

The standard mains electricity supply voltage across the EU is 230 V, so measurements and calculations are performed on the basis of this line voltage. 230 V is being adopted as the nominal voltage in a growing number of countries worldwide (e.g. Australia, India etc.).

Stage 1 (13.04.2010) – one year after the Regulation enters into force:

No requirements are defined for high intensity discharge lamps in stage 1.

Stage 2 (13.04.2012) – three years after the Regulation enters into force:

Table C.7 is taken from Regulation 245/2009 and shows the minimum efficiency permissible after stage 2 enters into force.

Table C.7 – Minimum efficiency for ballasts for high intensity discharge lamps – Stage 2
(Table 15 of the Regulation)
EEI=A3

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

Stage 3 (13.04.2017) – eight years after the Regulation enters into force:

Table C.8 is taken from Regulation 245/2009 and shows the minimum efficiency permissible after stage 3 enters into force.

Table C.8 – Minimum efficiency for ballasts for high intensity discharge lamps – Stage 3
(Table 16 of the Regulation)
A2

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

C.3.2 Energy performance requirements for standby operation

No limit values have been defined for ballasts for high intensity discharge lamps in standby operation.

C.3.3 Product information requirements for high intensity discharge lamp ballasts

Table C.9 shows the overview of product information which should be provided from the manufacturer.

Table C.9 – Product information HID Ballasts

	Stage 1 from 13.04.2010	Stage 2 from 13.04. 2012	Stage 3 from 13.04. 2017
On ballast	No requirements	Indication of efficiency	
Free-access website			
Technical documentation			

C.3.4 Indication of efficiency of high intensity discharge lamp ballasts

The typical measured efficiency of the product series is indicated on ballasts themselves and in the product documentation.

If the ballast fulfils the requirements of Table C.7:

EEl=A3

If the ballast fulfils the requirements of Table C.8:

A2

The detailed measurement method is under development as on IEC standard.

As a matter of principle, the CE marking on ballast constitutes confirmation by the manufacturer that the ballast conforms to the requirements of Regulation 245/2009.

C.4 Indicative benchmarks for ballasts

The Regulation includes benchmark values of the best available technology for specific lighting tasks at the time the Regulation enters into force. These values are purely informative. CELMA does not recommend using the proposed indicative benchmarks as they could hamper the free circulation of lighting products on the market because they could be made mandatory for specific uses (such as public procurement building regulations, etc) by some EU Member States only.

Annex 5 of the Regulation contains general information on the indicative benchmarks for lamps, ballasts and luminaires

- Fluorescent lamp ballasts should conform to energy efficiency class A1 BAT and be dimmable down to 10% light output.
- Ballasts for high intensity discharge lamps should be dimmable without steps down to 40% light output and have a ballast efficiency rating of at least 90%.

Annex 6 of the Regulation contains general information on the indicative benchmarks for office lighting

The Regulation sets out the following characteristics for benchmark ballasts:

- Fluorescent lamp ballasts should conform to energy efficiency class A1 BAT and be dimmable down to 10 % light output.
- Ballasts for high intensity discharge lamps should have an efficiency rating of 88 % up to 100 W lamp power and 90 % efficiency above 100 W. Ballasts for high intensity discharge lamps with a power rating over 50 W should be dimmable.

Annex 7 of the Regulation contains information on indicative benchmarks for street lighting

The Regulation sets out the following characteristics for benchmark ballasts:

- Fluorescent lamp ballasts should conform to energy efficiency class A1 BAT and be dimmable down to 10 % light output.
- Ballasts for high intensity discharge lamps should have an efficiency rating of 87 % up to 100 W lamp power and 89 % efficiency above 100 W. Ballasts for high intensity discharge lamps with a power rating over 55 W should be dimmable.

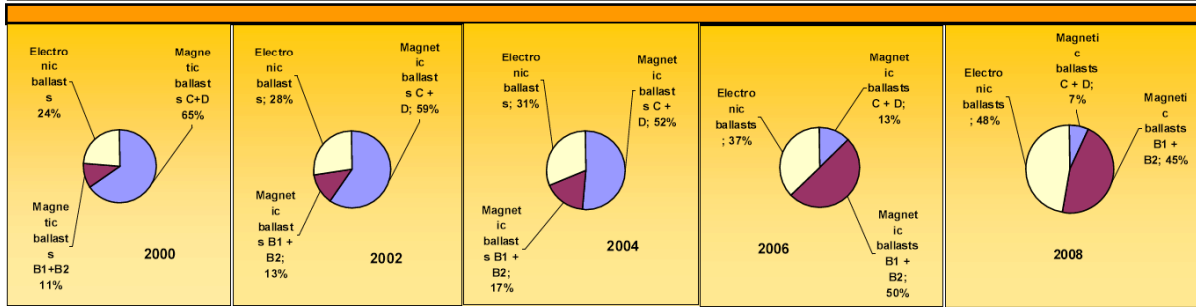
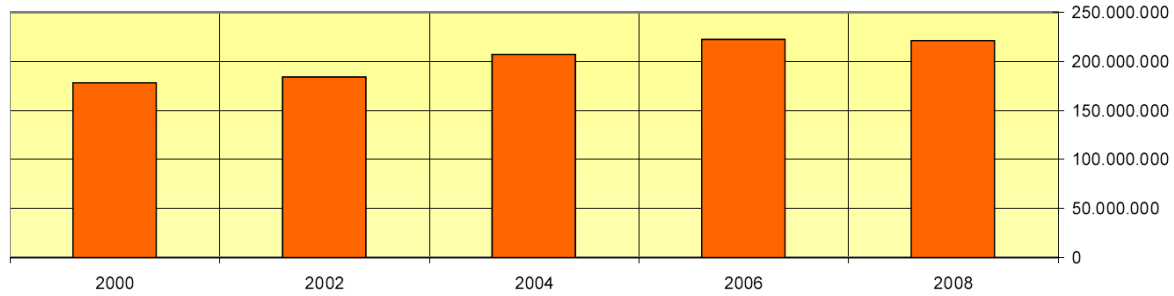
Recommendation:

CELMA does not recommend using the proposed indicative benchmarks in the Annexes V, VI and VII of the Regulation. The reason is that these indicative benchmarks could hamper the free circulation of lighting products on the market as they could be made mandatory for specific uses (such as public procurement building regulations, etc) by some EU Member States only.

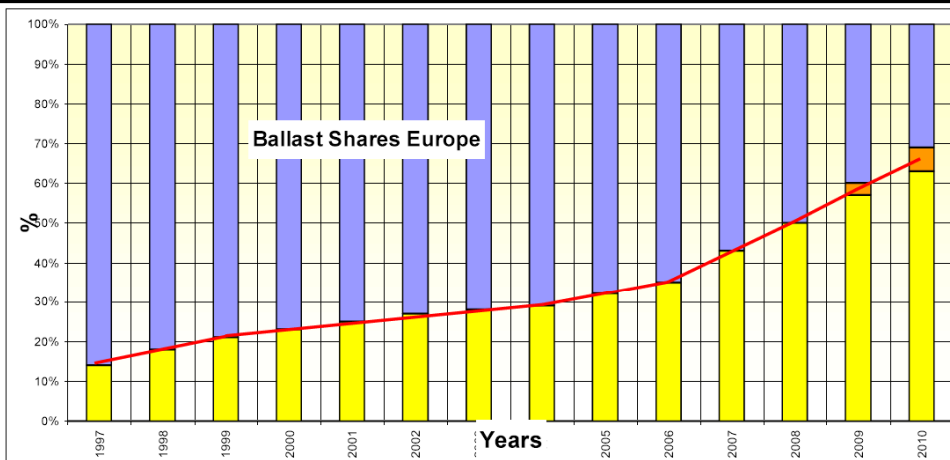
C.5 Ballast Market for fluorescent lamps in Europe

EUROPEAN BALLASTS MARKET - View over the last six years

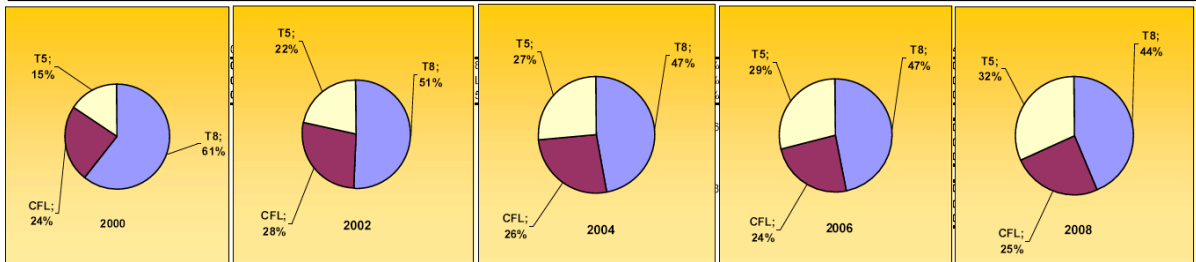
Number of new installed lamps driven by		2000	2002	2004	2006	2008
MAGNETIC BALLASTS	CELMA CLASS C + D	115.500.000	109.000.000	106.000.000	29.000.000	16.000.000
MAGNETIC BALLASTS	CELMA CLASS B1 + B2	20.000.000	24.000.000	36.000.000	110.000.000	100.000.000
ELECTRONIC BALLASTS	CELMA CLASS A1, A2 and A3	42.500.000	51.000.000	65.000.000	83.000.000	105.000.000
Total number of new installed lamps		178.000.000	184.000.000	207.000.000	222.000.000	221.000.000



The market share of Electronic Ballasts is grown from 24 % (2000) to 48 % (2008).

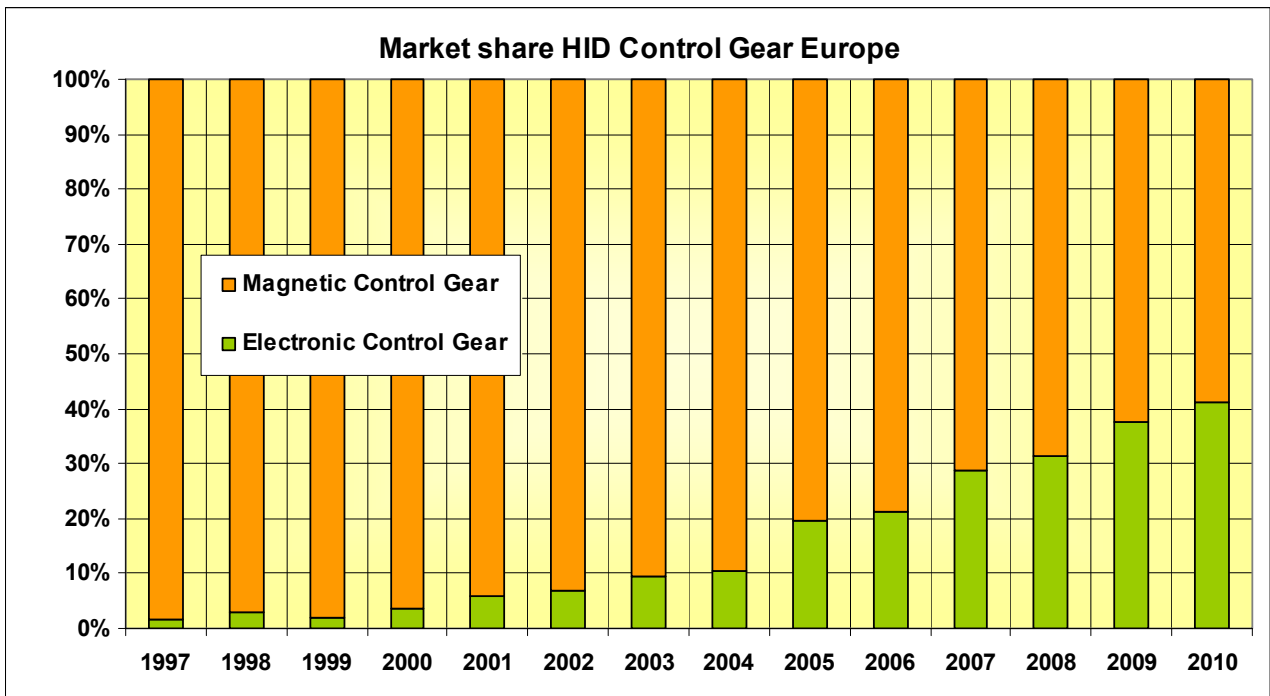
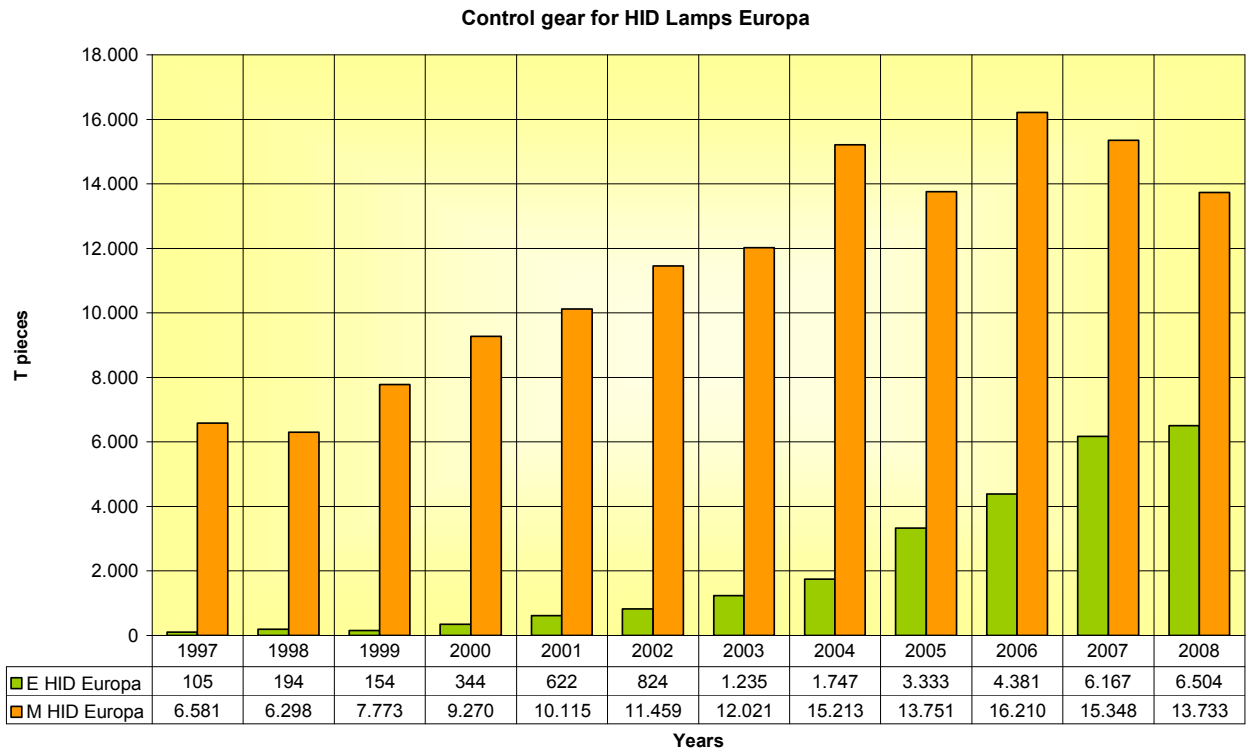


Market share (1997 to 2008) and expected market share (2009 to 2010) of the ballasts sales development in Europe based on operated lamps. (blue = magnetic ballasts, yellow = electronic ballasts, orange = tolerance band)



Market share of ballasts for the different lamp types. Ballasts for T5 lamps growing fast at the expense of T8. Ballasts for CFL lamps are quite stable.

C.6 Ballast Market for HID lamps in Europe



Annex D Luminaire requirements

D.1 Introduction

For the purposes of Regulation 245/2009, luminaires include lamps and ballasts. While ballasts are generally integrated, lamps are designed for replacement and are not normally supplied with the product. Luminaires distribute the light emitted by lamps according to the requirements of the relevant lighting application. Quality criteria's (e.g. glare limitation, shielding angle, etc.) play an important role in lighting. These are not considered in this Regulation.

The requirements are basically for general lighting and included fluorescent and high pressure discharge lamp luminaires.

D.2 Exemptions

The Regulation does not apply to:

- emergency lighting luminaires and emergency sign luminaires
- explosion-protected luminaires
- luminaires integrated into machinery
- medical products
- luminaires that are toy components

D.3 Energy efficiency requirements for luminaires

As a matter of principle, ballasts and lamps used in luminaires must conform to the relevant limit values stipulated by the Regulation.

Table D.1 – Energy efficiency requirements for luminaires

Luminaires for fluorescent lamps or high intensity discharge lamps		Stage 1 from 13.04.2010	Stage 2 from 13.04.2012	Stage 3 from 13.04.2017
Energy efficiency requirements for fluorescent lamp luminaires	Standard ballasts	Luminaire limit values = sum of ballast limit values (number of ballasts used – network connections or sensors are not assessed for standby losses). <i>n</i> = number of ballasts per luminaire		
	Dimmable ballasts			
	Standby losses	<i>n</i> x 1 Watt	<i>n</i> x 0,5 Watt	<i>n</i> x 0,5 Watt
Compatibility requirements for fluorescent and high intensity discharge lamps			Luminaires must be compatible with stage 3 ballast requirements. Exceptions: luminaires with at least IP4X.	All luminaires must be compatible with stage 3 ballast requirements.
Energy efficiency requirements of high intensity discharge lamp luminaires	Standard ballasts	No special requirements.	Luminaire limit values = sum of ballast limit values (number of ballasts used – network connections or sensors are not assessed for standby losses).	
	Dimmable ballasts			
	Standby losses			

This “compatibility” means that from the beginning of the stage 2, luminaires shall already be “compatible” with stage 3 ballasts. This option must be offered without major change of the luminaire design. The target of the requirement is also to save energy at the earlier stage 2. Although it is allowed to supply luminaires of stage 2 with ballast of stage 2 the Regulation tries to stimulate the use of stage 3 ballasts.

CELMA recommends luminaire manufacturers to use stage 3 ballasts (A1 BAT, A2 and A2 BAT) as soon as possible.

This CELMA recommendation underlines the framework for energy conservation and carbon emission reductions stipulated by the legislator for Regulation 245/2009.

In the case of ballasts for fluorescent lamps, the recommendation can already be widely realised.

Stage 3 ballasts for high intensity discharge lamps are already available for some applications.

Luminaires \geq IP4X are exempted from the requirement to use stage 3 ballasts in luminaire implementation stage 2 because the legislator has acknowledged the special needs of such luminaires. Experience of using electronic ballasts in luminaires \geq IP4X is still limited. In the coming years work will be geared to gather experience in the relevant applications in order to develop and standardise technical solutions. The switch-over for these luminaires must be realised by 2017.

D.4 Product information requirements

Intermediate stage 1 (13.09.2010) - 18 months after the Regulation enters into force

In the case of luminaires for high intensity discharge lamps, there are no product information requirements in the first luminaire implementation stage.

In the case of luminaires for fluorescent lamps with a total lamp lumen output $>$ 2,000 lm, information must be provided on free-access websites and in other appropriate forms (catalogue, specifications, data sheets) for each type of luminaire, not on the luminaire rating plate.

The technical information must also be included in the documentation relating to the EC declaration of conformity:

- a) the efficiency of the ballasts used in accordance with the ballast manufacturer's data;
- b) the efficiency of the lamps if these are supplied with the luminaires;
- c) if ballasts or lamps are not placed on the market together with the luminaires, the types of ballast and lamp approved for use in the luminaire must be identified;
- d) instructions for maintenance (e.g. cleaning, lamp replacement) needed to maintain the energy efficiency of the luminaires. This information should be contained in the installation guide;
- e) disassembly instructions to ensure that the luminaire can be properly disposed of at the end of its life. This information should be contained in the installation guide along with a note that the guide should be retained for future reference.

Stage 2 (13.04.2012) - three years after the Regulation enters into force:

Luminaires for high intensity discharge lamps need to meet the same requirements in stage 2 as luminaires for fluorescent lamps in stage 1. In addition:

- f) to ensure that luminaires have the required characteristics, there needs to be an indication on the luminaire that it is designed for use with clear and/or coated lamps.

Stage 3 (13.04.2017) - eight years after the Regulation enters into force:

No other requirements in stage 3.

D.5 Indicative benchmarks for luminaires

The Regulation indicates the benchmark values of the best available technology for specific lighting tasks at the time the Regulation enters into force.

Recommendation:

CELMA does not recommend using the proposed indicative benchmarks in the Annexes V, VI and VII of the Regulation. The reason is that these indicative benchmarks could hamper the free circulation of lighting products on the market as they could be made mandatory for specific uses (such as public procurement building regulations, etc) by some EU Member States only.

Annex 5 of the Regulation contains information on the indicative benchmarks for lamps, ballasts and luminaires.

For luminaires, the CEN flux code or full photometric data should be provided for compliance with the benchmark recommendations.

Annex 6 of the Regulation contains information on the indicative benchmarks for office lighting.

The Regulation sets out the following characteristics for benchmark luminaires:

- LMF > 0,95 in normal ambient pollution and with a 4-year cleaning cycle
- At least one lamp type is compatible with the Annex 5 benchmarks
- Luminaires are suitable for operation with lighting control systems offering:
 - presence detection
 - daylight-dependent regulation of the artificial lighting
 - brightness control to take account of changes in lighting requirements
 - brightness control to compensate for soil age and changes in light output and lamp efficacy
- Except for general-diffuse luminaires with no light-controlling elements, information should additionally be provided about the luminaire maintenance factor LMF.
- If the cleaning cycle is < 4 years, cleaning instructions must be provided in tabular form.
- In the case of luminaires with directional light sources such as reflector lamps or LEDs, the LLMF (lamp lumen maintenance factor) x LMF (luminaire maintenance factor) value should be provided instead of just the LMF value.

Annex 7 of the Regulation contains information on indicative benchmarks for street lighting.

The Regulation sets out the following characteristics for benchmark luminaires:

- IP 65 ingress protection for the optical system of street lights for class ME1-ME6 and MEW1-MEW6 roads
- IP 5x ingress protection for the optical system of street lights for class CE0-CE5, S1-S6, ES, EV and A roads

The proportion of light emitted going above the horizon shall be limited according to Table 25 of the Regulation.

In areas of high light pollution, no more than 1% should go above the horizontal. To CELMA's knowledge, there is no definition of high light pollution.

Luminaires are compatible with appropriate dimming and control systems that take account of available daylight as well as traffic and weather conditions and also compensate for variations in surface reflection and the initial dimensioning of the installation due to the lamp lumen maintenance factor.

The following information must also be provided:

- Utilisation factor values for standard road conditions in tabular form for the road classes defined. The table also contains UF values for road widths, pole heights, maximum pole spacing and luminaire overhang and inclination as appropriate for the given road class and luminaire design.
- Installation instructions for optimising the utilisation factor.
- Additional installation recommendations to minimise obtrusive light
- In the case of luminaires with directional light sources such as reflector lamps or LEDs, the LLMF (lamp lumen maintenance factor) x LMF (luminaire maintenance factor) value should be provided instead of just the LMF value.
- For luminaires with optical elements, the LMF value should be indicated in tabular form.

Recommendation:

CELMA does not recommend using the proposed indicative benchmarks in the Annexes V, VI and VII of the Regulation. The reason is that these indicative benchmarks could hamper the free circulation of lighting products on the market as they could be made mandatory for specific uses (such as public procurement building regulations, etc) by some EU Member States only.

Annex E Market surveillance

E.1 Verification procedure for market surveillance

When performing the market surveillance checks referred to in Article 3 (2) of Directive 2005/32/EC, the authorities of the Member States shall apply the following verification procedure for the requirements set out in Annex III.

For ballasts and luminaires:

Member State authorities shall test one single unit.

The model shall be considered to comply with the provisions set out in Annex III, Parts 2 and 3, as applicable, to this Regulation if the results do not exceed the limit values.

Otherwise, three more units shall be tested. The model shall be considered to comply with this Regulation if the average of the results of the latter three tests does not exceed the limit values.

Otherwise, the model shall be considered not to comply.

DISCLAIMER

This document provides only guidance to the definitive requirements detailed in the Commission Regulation (EC) N° 245/2009. Responsibility for compliance with the Regulation rests firmly with the manufacturer or the person placing the lighting products on the EU market for the first time. Compliance with the CELMA Guide DOES NOT necessarily provide compliance with the Commission Regulation (EC) N° 245/2009.

CONTACTS

For further information on the guide, please contact [CELMA](#).