

## **GUIDE**

for the application of  
Directive 2000/55/EC on  
energy efficiency requirements for  
ballasts for fluorescent lighting



## WHAT IS CELMA?

CELMA is a Federation established for an unlimited period, representing 20 National Manufacturers Associations for Luminaires and Electrotechnical Components for Luminaires. CELMA Associations are representing more than 90% of the market in the Luminaires and Electrotechnical Components for Luminaires industries in 12 European countries. These producers, which include many small and medium-sized companies, directly employ some 100,000 people and generate 8 billion Euros annually. CELMA acts as a Body of contact, co-ordination, representation and assistance for the European and National Associations, Federations and Organisations in the EU manufacturing of luminaires and electrotechnical components for the Luminaires Industry. Both the name and the logo of CELMA are registered and may not be used by third parties without the express written agreement of the General Assembly.

## SCOPE and OBJECTIVES of CELMA

CELMA studies any matters of common interest, with particular emphasis on their scientific, educational, legal and institutional aspects and provides sectorial policies such as contact, co-ordination, representation and assistance for European and national associations, federations and organisations in the EU involved in the manufacture of luminaires and electrotechnical components for the Luminaires Industry.

With this outlook, CELMA shall particularly endeavour to address the following items:

- To express the desires and needs appropriate to the membership.
- To maintain stable relations with the public authorities and, specifically with the institutions of the European Union, particularly with a view to keeping the Members fully informed of developments that may be of interest to them, and with a view to conveying the Members' needs and aspirations to those authorities.
- To solicit the adoption and compliance with common standards aimed at ensuring that uniform technical standards are respected with specific reference to matters relating to the production, testing, installation, safety, reliability, energy efficiency, environmental aspects and performance of lighting products.
- Within the limits of the EU and national competition laws to encourage fair business practices between luminaires, components and light-sources manufacturers as well as between manufacturers and their customers or suppliers and, where possible, the adoption of a Members' Common Code of Conduct.
- Within the limits of the EU and national competition laws to adopt and support any initiatives aimed at enhancing the image of the Associations, the Members and their products, which may be to their benefit.
- To combat any situation that places the Members of CELMA in a position hampering fair trade and competition.
- To combat the counterfeiting or the unauthorised copying of Members' products.
- To initiate instruments aimed at providing information, assistance and consultancy services for the Members' benefit.

# The ballasts manufacturers are represented in **CELMA ACTIVE COMPONENTS** WORKING GROUP

## Who is CELMA ACTIVE COMPONENTS Working Group?

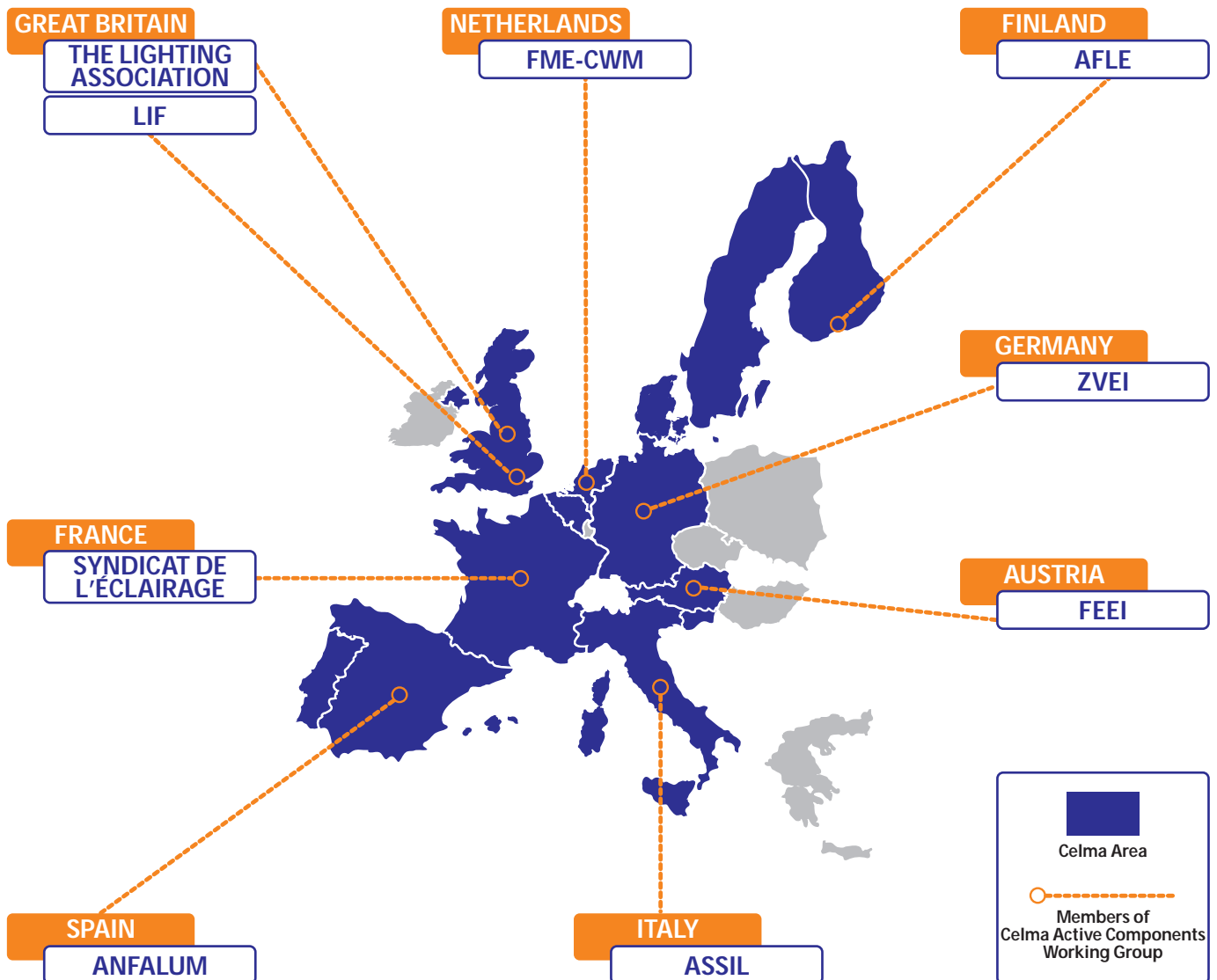
CELMA ACTIVE COMPONENTS is a working group within CELMA Federation composed of National Associations in which manufacturers of components are members.

## Which components are covered?

Ballasts, transformers, ignitors, capacitors, etc....

## CELMA AREA

### Members of CELMA ACTIVE COMPONENTS Working Group





## WHY A NEW DIRECTIVE ?

The governments that participated in the climate conferences of Rio, Kyoto, The Hague and Bonn aim to reduce emissions of carbon dioxide (CO<sub>2</sub>) as one of the so-called greenhouse gases. CO<sub>2</sub> is a waste product created during production of electrical power. Lighting is estimated to account for around 15% of the electricity consumed in the industrialised world. To harness the maximum energy saving potential of artificial lighting systems without compromising on the quality of lighting, the industry has constantly developed new products and systems which consume less energy.

A significant amount of electricity consumption in the EU is accounted for by fluorescent lighting. Fluorescent lighting has very different levels of consumption for a given type of lamp, i.e. it differs widely in terms of energy efficiency.

The Directive 2000/55/EC (OJEC L297 - 1 November 2000) aims at reducing the energy consumption of ballasts for fluorescent lighting by moving gradually away from the less efficient ballasts and towards more efficient ones.

The ballast, however, is only one part of the energy consumption equation. The degree of energy efficiency of fluorescent lighting circuits depends upon the combination of ballast and lamp. As a consequence CELMA has found it necessary to develop a ballast classification system based on this combination.

## WHO ARE THE BENEFICIARIES ?

### **BALLAST MANUFACTURERS**

Through the application of the scheme they will be able to control their production to the market demand.

### **LUMINAIRE MANUFACTURERS**

Will have the possibility to choose the right ballast for the application.

### **LIGHTING DESIGNERS AND WHOEVER IS RESPONSIBLE FOR THE LIGHTING PROJECT**

Will be able to choose the ballast starting from objective evaluations and not from personal considerations.

## IMPLEMENTATION BY THE BALLASTS MANUFACTURERS

The European Ballasts manufacturers, represented in CELMA, have adopted the scheme of classification of ballasts defined by CELMA since 1999. As a consequence all ballasts falling under the scope of the 2000/55/EC Directive are marked with the pertinent EEI printed in the label or stated in the manufactures' literature. The scheme of classification is based on a voltage of 230V (Harmonised voltage) and a frequency of 50Hz.

The following deviations are managed as hereunder specified:

Voltage supply : 240V

Voltage supply : 220V

Voltage supply : 110V, 120V

Frequency : 60Hz

Series compensation.

### **VOLTAGE SUPPLY: 240V**

Products for the markets with 240V will be supplied with a rated voltage of 240V but with a classification value measured at 230V as the harmonised voltage. The 15 member countries of the EU have all signed up to comply with the requirements of the Voltage Harmonization policy which centres its nominal voltage of supply at 230V. The measurement standard EN 50294 reflects this as a logical consequence.

### **VOLTAGE SUPPLY: 220V**

Products for the markets with 220V will be supplied with a rated voltage of 220V but with a classification value measured at 230V as the harmonised voltage. The 15 member countries of the EU have all signed up to comply with the requirements of the Voltage Harmonization policy which centres its nominal voltage of supply at 230V. The measurement standard EN50294 reflects this as a logical consequence.

### **VOLTAGE SUPPLY : 110V, 120V**

These voltages are not in use in the EU market and are out of the Voltage Harmonization policy. The measurement method Standard EN 50294, based on 230V harmonized voltage, excludes therefore the ballasts with these special voltage supplies. As a consequence the ballasts for these special voltages are displaying the "CE" marking only as a conformity to the Low Voltage Directive (LVD) and Electro Magnetic Compatibility Directive (EMC) and this will be clearly put in evidence in the corresponding Declaration of Conformity.

### **FREQUENCY: 60Hz**

The frequency commonly adopted in EU market is 50Hz. The measurement method Standard EN 50294, based on 230V harmonized voltage, excludes therefore the ballasts with special frequencies. As a consequence the ballasts for application at 60Hz are displaying the "CE" marking only as a conformity to the Low Voltage Directive (LVD) and Electro Magnetic Compatibility Directive (EMC) and this will be clearly put in evidence in the corresponding Declaration of Conformity.

### **SERIES COMPENSATION**

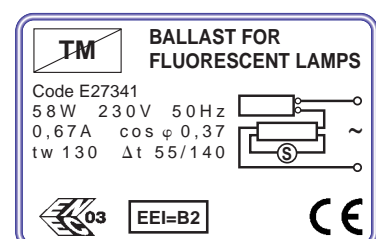
In some countries, the power factor correction for magnetic ballasts is traditionally made by a capacitor in series with the ballast. Due to its characteristics and the tolerances, this circuit causes a higher lamp current and therefore higher ballast losses. The system wattage of inductive ballasts in series with a power factor correction capacitor therefore may not meet the limits according to the Energy Efficiency Index (EEI) marked on the ballast. Power factor correction capacitors in parallel to the supply voltage do not have any impact on the ballast losses, consequently they appear the only way to satisfy the maximum values required. For installations, where a parallel compensation is not possible, please contact your ballast supplier for detailed information and solutions.

## THE LABEL

The EEI refers to the CELMA classification scheme.

**The label on the product will indicate the class defined through the Energy Efficiency Index (EEI). Marking of the EEI class is not mandatory.**

Example of the typical markings of the ballast showing Energy Efficiency Index





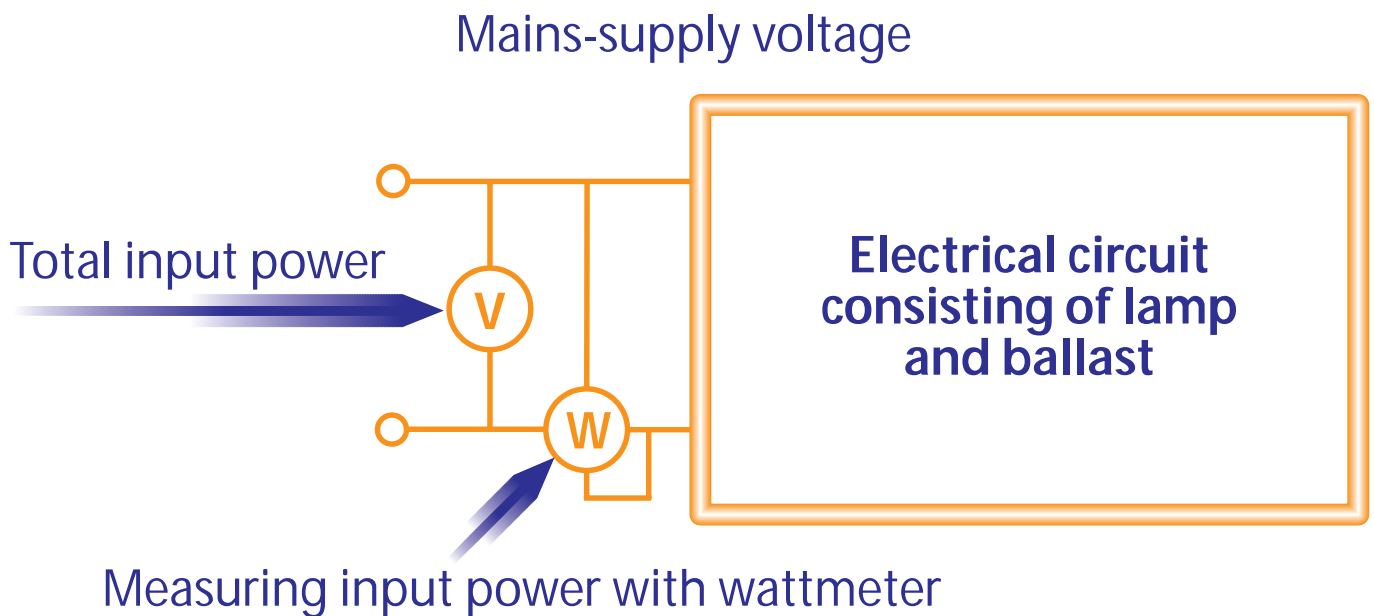
## HOW IS IT DEFINED ?

The corrected total input power of the lamp-ballast circuit is defined as the “Energy Efficiency Index” (EEI) of the ballast-lamp combination. The grading consists of different classes defined by a limiting value.

There are seven classes of efficiency. The classes have no direct correlation to a specific technology; every class is defined by a limiting value of total input power related to the corresponding ballast lumen factor.

The classes are A1, A2, A3, B1, B2, C and D.

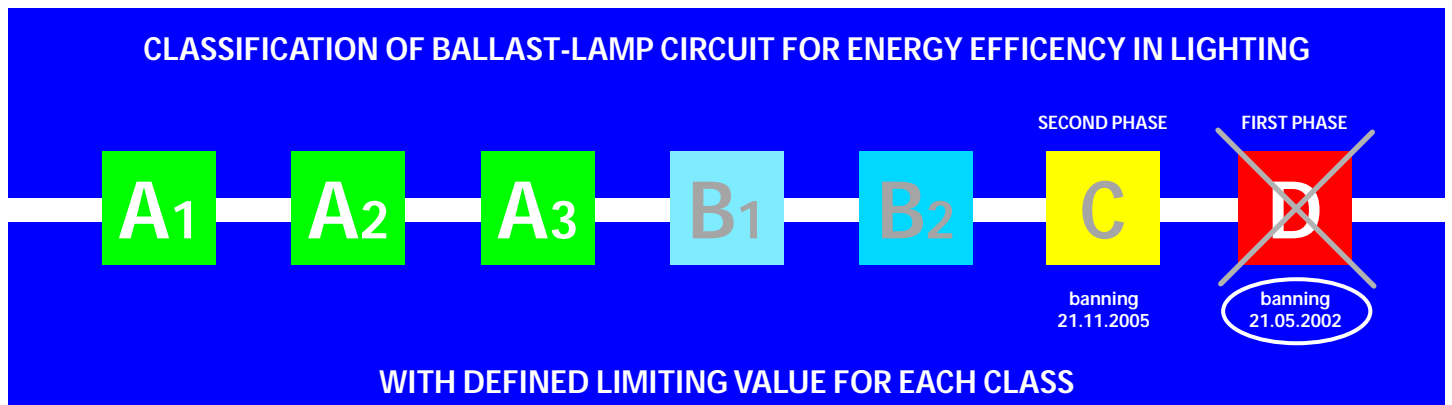
Every class is defined by a limiting value of total input power when referenced with a BLF 1.00 for high frequency operated ballasts and 0.95 for magnetic ballasts. The Energy Efficiency Index (EEI) is compared to the corresponding table to obtain the relevant energy class of the ballast-lamp combination.



The application of the scheme refers only to the consumption of electrical energy, in Watts, by the lamp-ballast circuit measured at an ambient temperature of 25 °C.

The scheme should not be used to classify the energy efficiency of the luminaire where additional aspects may need to be considered such as luminous intensity, light distribution, glare, etc. ...

# THE PRESENT AND THE FUTURE



## THERE ARE BALLASTS AND BALLASTS

According to the CELMA classification scheme the following classes and typical ballast types exist:

- class D: magnetic ballasts with very high losses
- class C: magnetic ballasts with moderate losses
- class B2: magnetic ballasts with low losses
- class B1: magnetic ballasts with very low losses
- class A3: electronic ballasts
- class A2: electronic ballasts with reduced losses
- class A1: dimmable electronic ballasts

Dimmable ballasts are classified A1 if they fulfil the following requirements:

- at 100% light output setting the ballast fulfils at least the demands belonging to A3;
- at 25% light output setting the total input power is equal to or less than 50% of the power at the 100% light output setting;
- the ballast must be able to reduce the light output to 10% or less of the maximum light output.

A conventional magnetic ballast, conforming to CELMA energy efficiency scheme class C, limits a system total input power to 70W when operating a 58W fluorescent lamp.

With magnetic ballasts conforming to CELMA energy efficiency scheme class D, those losses are even higher, so the total power consumption is also greater.

Magnetic ballasts conforming to CELMA energy efficiency scheme classes B1 and B2 have a thicker copper wire and an iron core subject to less power dissipation. This development reduces internal losses. A class B2 ballast operating a 58W fluorescent lamp, has a total input power of 67W, which is 3W less than that of a Class C ballast-lamp circuit.

Electronic ballasts (conforming to CELMA energy efficiency scheme classes A1, A2 and A3) are major power savers. They even reduce the power consumption of ballast-lamp circuits to less than the rated power of the lamp at 50Hz. This is caused by the increased lamp efficiency at high frequencies (>20kHz), leading to about 10% less lamp power and a decrease of the ballast losses.



# NEW EUROPEAN GUIDELINES

The European Standard EN 50294 fixes the measuring methods for the total input power of the ballast-lamp system. Using this European Standard as a basis, CELMA (the European Federation of the National Associations of the manufacturers of luminaires, control gears and lampholders) has fixed both energy classes and limit values for the ballast-lamp combination of the most common fluorescent lamps.

## Energy Efficiency Index (EEI)

The "Energy Efficiency Index" system contains 7 classes: A1, A2, A3, B1, B2, C and D. The guideline is valid for mains-operated ballasts for fluorescent lamps.

The EEI system comprises the following lamp types:

- Tubular fluorescent lamps T8
- Compact fluorescent lamps TC-L
- Compact fluorescent lamps TC-D
- Compact fluorescent lamps TC-T
- Compact fluorescent lamps TC-DD

### The 7 EEI classes using a 36 W T8 (T26) lamp as an example

Class	Description	System power in Watts
D =	magnetic ballasts with very high losses	> 45 W
C =	magnetic ballasts with moderate losses	≤ 45 W
B2 =	magnetic ballasts with low losses	≤ 43 W
B1 =	magnetic ballasts with very low losses	≤ 41 W
A3 =	electronic ballasts	≤ 38 W
A2 =	electronic ballasts with reduced losses	≤ 36 W
A1 =	dimnable electronic ballasts	≤ 38/19 W (at 100% - 25%)

### Phase-out dates according to European Directive 2000/55/EC

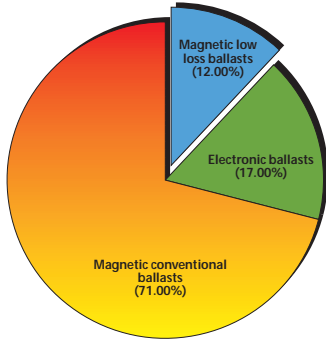
Step 1	21.05.2002	class D	to be discontinued
Step 2	21.11.2005	class C	to be discontinued

The wide range of high performance magnetic and electronic ballasts offered by leading European ballasts manufacturers enables immediate upgrading from conventional magnetic products to high performance versions, i.e. B2, B1, A3 and A2. In addition to these products the market also offers complete ranges of high performance controllable electronic ballasts, i.e. A1 class, featuring additional advantages like lighting management systems. The market also offers solely purchase-cost oriented electronic ballasts, which require a correct knowledge of the application in order to guarantee the performances expected by the end user.

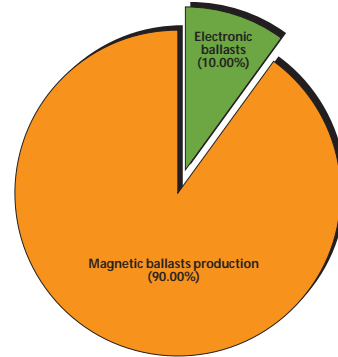


# MARKET SHARE

**BALLASTS SALES IN EU MARKET 2000**



**BALLASTS PRODUCTION IN EU MARKET 2000**



Magnetic ballasts	class C and D	105,080,000
Magnetic low loss ballasts	class B1 and B2	17,760,000
Electronic ballasts	class A1, A2 and A3	25,160,000

Magnetic ballasts	180,000,000	90%
Electronic ballasts	20,000,000	10%

## LIGHTING POINT INDEX

Operated on a conventional ballasts, most lamp wattages need one ballast per lamp. The main exemption in the 18W T8 lamp where 2 lamps can be operated at a 36 W ballast. Based on a different technology, electronic ballasts are designed to operate several lamps at the same time which allows the use of one ballast only for any luminaire, independent on the number of lamps.

Based on market behaviour (single, twin and multilamp luminaires) as an European average, the following lighting point index is valid:

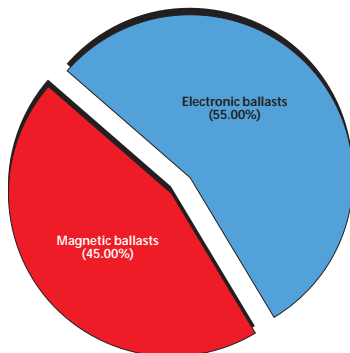
<b>LIGHTING POINT INDEX FOR MAGNETIC BALLASTS</b>	<b>1.1</b>
<b>LIGHTING POINT INDEX FOR ELECTRONIC BALLASTS</b>	<b>1.7</b>

## EQUIVALENCE OF LIGHTING POINTS AND BALLASTS SALES MARKET SHARE IN EU MARKET 2000

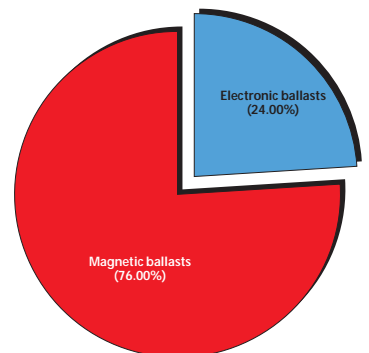
Using the Lighting Point Index the Lighting Points (Lamps) supplied with a ballast are corrected as follows:

Magnetic Ballasts	135,124,000	76%
Electronic ballasts	42,772,000	24%

The EU Directive 2000/55/EC aims to reach a market transformation by 31.12.2005 with the following values: class A ballasts 55%, class B and C (sold upto 21.11.2005) ballasts 45%.



Therefore the equivalence of Lighting Points supplied by ballasts in 2000 are shown in the following chart.





# CE MARKING



The CE marking must be affixed visibly, legibly and indelibly to ballasts and their packaging (incl. bulk packaging).

Where ballasts are incorporated in luminaires, the CE marking needs to be affixed to the luminaires and their packaging (for practical reasons this may include bulk packaging). For the first time, the CE marking is required to be affixed not only to the product itself but also to ballast or luminaire packaging!

After the prohibition deadlines set out, products which do not conform to the Directive will thus be ineligible for the CE marking. Compliance with the requirements of the Low-Voltage and EMC Directives alone will no longer be sufficient!

The procedures and rules for the affixing and use of the CE conformity marking are in accordance with Module A (Manufacturers Declaration) of Council Decision 93/465/EEC, which sets out the modules to be used in the technical harmonisation directives for the various phases of the procedures for conformity assessment and the rules for affixing and use of the CE conformity marking.

# PLACING ON THE MARKET

The European Commission's Guide to the implementation of Directives based on the New Approach and the Global Approach (ISBN 92-828-7500-8), explains under item 2.3.1 "Placing on the market" as the initial action of making a product available for the first time on the Community market with a view to distribution or use in the community. Therefore, according to the Directive, a product can only be initially placed on the market once.

Luminaires manufacturers are advised to commence use of conforming ballasts as soon as possible.

Ballasts already in stock should, according to the Commission's Guidelines, be considered already placed on the market.

In this connection, the role of the different market players has to be considered.

The following possibilities exist:

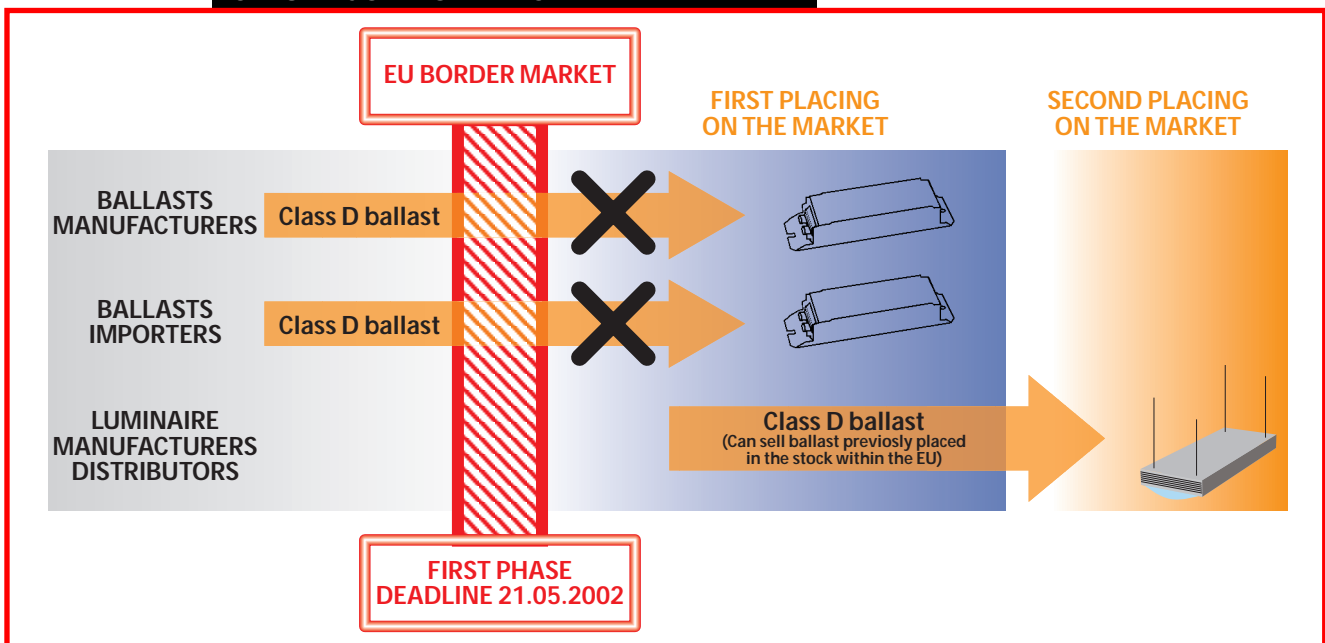
Ways of ballasts sales	Players involved	Actions
Single component	Ballasts manufacturers	Must respect the deadline established
Single component	Ballasts importers	Must respect the deadline established
Single component	Luminaire manufacturers Distributors	Can sell ballasts previously placed in stock within the EU
Component built into the luminaire	Luminaire manufacturers inside EU	Can sell the luminaire with ballasts previously placed on the EU market before the deadline
Component built into the luminaire	Luminaire importers	Can only import the luminaires with compliant ballasts

“Placing on the market” means introducing a Directive compliant product on a commercial or non-commercial basis in the EU for the purpose of marketing and/or using it within the EU.

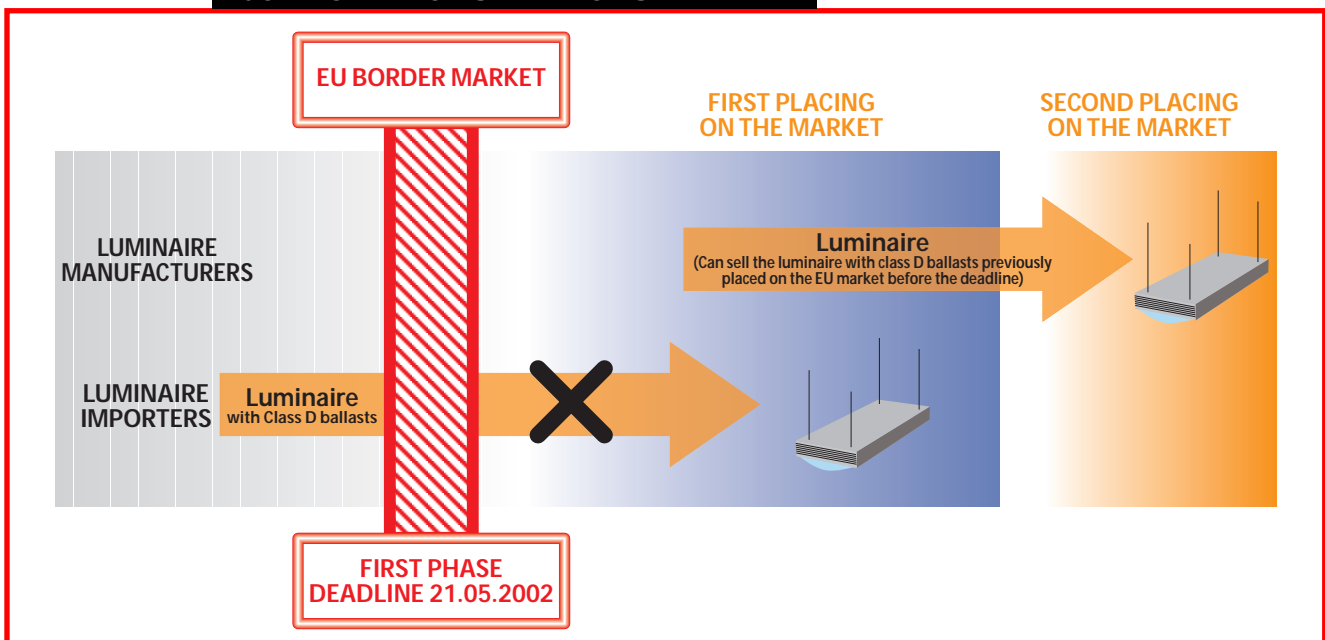
Placing on the market defines the point at which a product emerges from the phase of its manufacture in the EU or importation from a non-EU country and enters the phase of its marketing and/or use within the EU. As placing on the market refers only to a product’s first introduction in the EU for the purpose of marketing and/or use within the EU, the Directive applies only to products which are made in the EU and new or used products imported from non-EU countries.

The EU member states are not allowed to prohibit, restrict or impede the placing on the market in their territory of products which fall within the scope of the Directive and bear the “CE” marking as evidence of their conformity to the Directive.

### SINGLE COMPONENTS

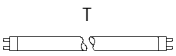


### COMPONENTS BUILT INTO LUMINAIRE

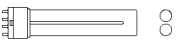




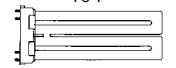
# Annex I - Ballast-lamp circuit falling within EU Directive 2000/55/EC

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
	FD-15-E-G13-26/450	15W	13.5W	9W	16W	18W	21W	23W	25W	> 25W
	FD-18-E-G13-26/600	18W	16W	10,5W	19W	21W	24W	26W	28W	> 28W
	FD-30-E-G13-26/895	30W	24W	16,5W	31W	33W	36W	38W	40W	> 40W
	FD-36-E-G13-26/1200	36W	32W	19W	36W	38W	41W	43W	45W	> 45W
	FD-38-E-G13-26/1047	38W	32W	20W	38W	40W	43W	45W	47W	> 47W
	FD-58-E-G13-26/1500	58W	50W	29,5W	55W	59W	64W	67W	70W	> 70W
	FD-70-E-G13-26/1800	70W	60W	36W	68W	72W	77W	80W	83W	> 83W


EU 2000/55/EC Category 1

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
	FSD-18-E-2G11	18W	16W	10,5W	19W	21W	24W	26W	28W	> 28W
	FSD-24-E-2G11	24W	22W	13,5W	25W	27W	30W	32W	34W	> 34W
	FSD-36-E-2G11	36W	32W	19W	36W	38W	41W	43W	45W	> 45W

EU 2000/55/EC Category 2

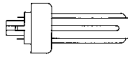
Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
	FSS-18-E-2G10	18W	16W	10,5W	19W	21W	24W	26W	28W	> 28W
	FSS-24-E-2G10	24W	22W	13,5W	25W	27W	30W	32W	34W	> 34W
	FSS-36-E-2G10	36W	32W	19W	36W	38W	41W	43W	45W	> 45W

EU 2000/55/EC Category 3

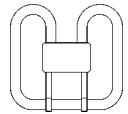
Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
	FSQ-10-E-G24q1 FSQ-10-I-G24d1	10W	9,5W	6,5W	11W	13W	14W	16W	18W	> 18W
	FSQ-13-E-G24q1 FSQ-13-I-G24d1	13W	12,5W	8W	14W	16W	17W	19W	21W	> 21W
	FSQ-18-E-G24q2 FSQ-18-I-G24d2	18W	16,5W	10,5W	19W	21W	24W	26W	28W	> 28W
	FSQ-26-E-G24q3 FSQ-26-I-G24d3	26W	24W	14,5W	27W	29W	32W	34W	36W	> 36W

EU 2000/55/EC Category 4

## Annex I - Ballast-lamp circuit falling within EU Directive 2000/55/EC

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
			FSM-18-I - GX24d2 FSM-18-E-GX24q2	18W	16,5W	10,5W	19W	21W	24W	26W
	FSM-26-I - GX24d3 FSM-26-E-GX24q3	26W	24W	14,5W	27W	29W	32W	34W	36W	> 36W

EU 2000/55/EC Category 5

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
			FSS-10-E-GR10q FSS-10-L/P/H-GR10q	10W	9W	6,5W	11W	13W	14W	16W
	FSS-16-I -GR8 FSS-16-E-GR10q FSS-16-L/P/H-GR10q	16W	14W	8,5W	17W	19W	21W	23W	25W	> 25W
	FSS-21-E-GR10q FSS-21-L/P/H-GR10q	21W	19W	12W	22W	24W	27W	29W	31W	> 31W
	FSS-28-I-GR8 FSS-28-E-GR10q FSS-28-L/P/L-GR10q	28W	25W	15,5W	29W	31W	34W	36W	38W	> 38W
	FSS-38-E-GR10q FSS-38-L/P/L-GR10q	38W	34W	20W	38W	40W	43W	45W	47W	> 47W

EU 2000/55/EC Category 6

## UK MARKET - 240V

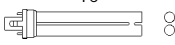
Products for markets with 240V mains supply will be supplied with a rated voltage of 240V but with a classification value measured at 230V as harmonised voltage. The 15 member countries of the EU have all signed up to comply with the requirements of the Voltage Harmonization policy which centres its nominal voltage of supply at 230V. The measurement standard EN50294 reflects this as a logical consequence.


## 60Hz BALLASTS

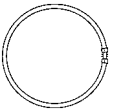
The frequency commonly adopted in EU market is 50Hz. The measurement method standard EN 50294, based on 230V harmonized voltage, excludes therefore the ballasts with special frequencies. As a consequence the ballasts for application at 60Hz displaying the "CE" marking only as a conformity to the **Low Voltage Directive (LVD)** and **Electro Magnetic Compatibility Directive (EMC)** and this will be clearly put in evidence in the corresponding Declaration of Conformity.



## Annex II - Ballast-lamp circuit not mentioned in Annex I of the EU Directive 2000/55/EC

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
			FSD-5-I-G23 FSD-5-E-2G7	5W	4,5W	4W	7W	8W	10W	12W
	FSD-7-I-G23 FSD-7-E-2G7	7W	6,5W	5W	9W	10W	12W	14W	16W	> 16W
	FSD-9-I-G23 FSD-9-E-2G7	9W	8W	6W	11W	12W	14W	16W	18W	> 18W
	FSD-11-I-G23 FSD-9-E-2G11	11W	11W	7,5W	14W	15W	16W	18W	20W	> 20W

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
			FD-4-E-G5-16/150	4W	3,4W	3,5W	6W	7W	9W	11W
	FD-6-E-G5-16/225	6W	5,1W	4W	8W	9W	11W	13W	15W	> 15W
	FD-8-E-G5-16/300	8W	6,7W	5W	11W	12W	13W	15W	17W	> 17W
	FD-13-E-G5-16/526	13W	11,8W	8W	15W	16W	17W	19W	21W	> 21W

Lamp type	Ilcos code	Lamp power		CLASS						
		50Hz	HF	A1	A2	A3	B1	B2	C	D
			FC-22-E-G10q-29	22W	19W	12W	22W	24W	28W	30W
	FC-32-E-G10q-29	32W	30W	18,5W	35W	37W	38W	40W	42W	42W
	FC-40-E-G10q-29	40W	32W	19,5W	37W	39W	46W	48W	50W	50W

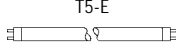
## UK MARKET - 240V

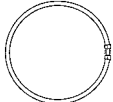
Products for markets with 240V mains supply will be supplied with a rated voltage of 240V but with a classification value measured at 230V as harmonised voltage. The 15 member countries of the EU have all signed up to comply with the requirements of the Voltage Harmonization policy which centres its nominal voltage of supply at 230V. The measurement standard EN50294 reflects this as a logical consequence.

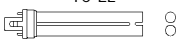
## 60Hz BALLASTS

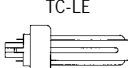
The frequency commonly adopted in EU market is 50Hz. The measurement method standard EN 50294, based on 230V harmonized voltage, excludes therefore the ballasts with special frequencies. As a consequence the ballasts for application at 60Hz displaying the "CE" marking only as a conformity to the **Low Voltage Directive (LVD)** and **Electro Magnetic Compatibility Directive (EMC)** and this will be clearly put in evidence in the corresponding Declaration of Conformity.


## Annex III - New ballast-lamp circuit not mentioned in Annex I of the EU Directive 2000/55/EC - Lamps operated only in High Frequency

Lamp type	Ilcos code	Lamp power HF	CLASS						
			A1	A2	A3	B1	B2	C	D
	FDH-14-G5-L/H-16/550	14W	9,5W	17W	19W				
	FDH-21-G5-L/H-16/850	21W	13W	24W	26W				
	FDH-24-G5-L/H-16/550	24W	14W	26W	28W				
	FDH-28-G5-L/H-16/1150	28W	17W	32W	34W				
	FDH-35-G5-L/H-16/1450	35W	21W	39W	42W				
	FDH-39-G5-L/H-16/850	39W	23W	43W	46W				
	FDH-49-G5-L/H-16/1450	49W	29W	55W	58W				
	FDH-54-G5-L/H-16/1150	54W	31,5W	60W	63W				
	FDH-80-G5-L/H-16/1150	80W	47,5W	88W	92W				

Lamp type	Ilcos code	Lamp power HF	CLASS						
			A1	A2	A3	B1	B2	C	D
	FCH-22-L/P-2GX13-16	22W	14W	26W	28W				
	FCH-40-L/P-2GX13-16	40W	24W	45W	48W				
	FCH-55-L/P-2GX13-16	55W	32,5W	61W	65W				

Lamp type	Ilcos code	Lamp power HF	CLASS						
			A1	A2	A3	B1	B2	C	D
	FCH-40-L/P-2GX13-16	40W	24W	45W	48W				
	FCH-55-L/P-2GX13-16	55W	32,5W	61W	65W				

Lamp type	Ilcos code	Lamp power HF	CLASS						
			A1	A2	A3	B1	B2	C	D
	FSMH-32-L/P-GX24q4	32W	19,5W	36W	39W				
	FSMH-42-L/P-GX24q4	42W	25W	47W	50W				

Lamp type	Ilcos code	Lamp power HF	CLASS						
			A1	A2	A3	B1	B2	C	D
	FCH-55-L/P-2GX13-16	55W	32,5W	61W	65W				

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#### DISCLAIMER

*This CELMA document provides only guidance to definitive requirements detailed in EU Directive 2000/55/EC. Responsibility for compliance with the Directive rests firmly with the manufacturer or the person placing the ballast on the EU market for the first time. Compliance with the CELMA Guide DOES NOT necessarily provide compliance with the Directive 2000/55/EC.*



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