

**WORKING DOCUMENT**  
**ON A POSSIBLE COMMISSION REGULATION**  
**IMPLEMENTING DIRECTIVE 2005/32/EC WITH REGARD TO**  
**TERTIARY SECTOR LIGHTING PRODUCTS**

*Chapter 1*  
*Subject matter and scope*

This Regulation establishes ecodesign requirements related to tertiary sector lighting products for general lighting even when they are integrated into other products providing a general lighting function.

The products listed in Annex II are exempted from the requirements of this Regulation.

*Chapter 2*  
*Definitions*

For the purposes of this Regulation, the definitions set out in Directive 2005/32/EC shall apply. The following definitions shall also apply:

1. "Tertiary sector lighting products" comprise
  - a) fluorescent lamps without integrated ballast, and ballasts and luminaires able to operate such lamps;
  - b) high intensity discharge lamps, and ballasts and luminaires able to operate such lamps;
  - c) lamps manufactured for use in office lighting, and ballasts and luminaires able to operate such lamps, regardless of their technology;
  - d) lamps manufactured for use in public street lighting, and ballasts and luminaires able to operate such lamps, regardless of their technology.
2. "General lighting" means substantially uniform lighting of an area without provision for special local requirements.
3. "Office lighting" means a fixed lighting installation for office work intended to enable people to perform visual tasks efficiently and accurately, in its short form "fixed lighting for office task areas".
4. "Public street lighting" means a fixed lighting installation intended to provide good visibility to users of outdoor public traffic areas during the hours of darkness to support traffic safety, traffic flow and public security.
5. "Lamp" or "light source" means a source made in order to produce an optical radiation, usually visible.

6. "Ballast" means a device which serves mainly to limit the current of the lamp(s) to the required value in case it is connected between the supply and one or more discharge lamps. A ballast may also include means for transforming the supply voltage, dimming the lamp, correcting the power factor and, either alone or in combination with a starting device, providing the necessary conditions for starting the lamp(s).
7. "Luminaire" shall mean an apparatus which distributes, filters or transforms the light transmitted from one or more light sources and which includes all the parts necessary for supporting, fixing and protecting the light sources, but not the light sources themselves, and where necessary, circuit auxiliaries together with the means for connecting them to the supply.
8. "Fluorescent lamps" mean discharge lamps of the low pressure mercury type in which most of the light is emitted by one or several layers of phosphors excited by the ultraviolet radiation from the discharge. "Fluorescent lamps without integrated ballast" mean single and double capped fluorescent lamps without integrated ballast.
9. "High intensity discharge lamps" mean electric discharge lamps in which the light producing arc is stabilized by wall temperature and the arch has a bulb wall loading in excess of 3 watts per square centimetre.
10. Further definitions of more technical terms used in the Annexes are provided in Annex I.

### *Chapter 3* ***Ecodesign requirements***

With the exception of the products listed in Annex II:

Products falling under the definition of Chapter 2, first paragraph, points a.) and b.) shall meet the ecodesign requirements set out in Annex III.

### *Chapter 4* ***Benchmarks***

The benchmarks for best-performing products and technology available on the market at the time of drafting this Regulation are of indicative nature and are identified in Annex IV for products falling under the definition of Chapter 2, first paragraph, points a.) and b.) and in Annexes V and VI for products falling under the definition of Chapter 2, first paragraph, points c.) and d.)

### *Chapter 5* ***Conformity assessment***

The procedure for assessing conformity referred to in Article 8 of Directive 2005/32/EC shall be the internal design control system set out in Annex IV of Directive 2005/32/EC or the management system set out in Annex V of Directive 2005/32/EC.

For the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC, the technical documentation file shall contain the elements required in Annex III parts 1, 4, and 6. It shall also contain a copy of the product information provided as required in those parts.

*Chapter 6*  
***Verification procedure for market surveillance purposes***

Surveillance checks shall be carried out in accordance with the verification procedure set out in Annex VII.

*Chapter 7*  
***Repeals***

Directive 2000/55/EC shall be repealed one year after the entry into force of this regulation.

*Chapter 8*  
***Revision***

No later than 5 years after entry into force of this Regulation the Commission shall review it (including the annexes) in the light of technological progress and present the result of this review to the Consultation Forum.

*Chapter 9*  
***Entry into force***

This Regulation shall enter into force on the 20th day following that of its publication in the *Official Journal of the European Union*.

Annex III specifies for each ecodesign requirement the period of time after the date referred to in the first paragraph following which the requirement applies. Unless superseded or otherwise specified, requirements set for earlier stages remain in force after the application of the requirements in later stages.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

*For the Commission*

*Member of the Commission*

**ANNEX I**  
**Definition of expressions and parameters used in the annexes**

The definitions in this Annex are complementary to those provided in Chapter 2.

**1. MEASURED PARAMETERS**

The parameters below shall be established by reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art.

- a) "Luminous efficacy of a source", "light source efficacy" or "lamp efficacy" ( $\eta_{\text{source}}$ ) means the quotient of the luminous flux emitted ( $\Phi_v$ ) by the power consumed by the source ( $P_{\text{source}}$ ).  $\eta_{\text{source}} = \Phi_v / P_{\text{source}}$ . Unit: lm/W The power dissipated by auxiliary equipment such as ballasts is not included in the power consumed by the source.
- b) "Lamp Lumen Maintenance Factor" (LLMF) means the ratio of the luminous flux emitted by the lamp at a given time in its life to the initial luminous flux.
- c) "Lamp Survival Factor" (LSF) means the fraction of the total number of lamps which continue to operate at a given time under defined conditions and switching frequency.
- d) Ballast efficiency ( $\eta_{\text{ballast}}$ ) means the ratio between the lamp power (ballast output) and the input power of the lamp-ballast circuit with possible sensors, network connections and other auxiliary loads disconnected.
- e) "Lamp mercury content" shall mean the amount of mercury contained in the lamp.
- f) "Chromaticity" shall mean the property of a colour stimulus defined by its chromaticity coordinates, or by its dominant or complementary wavelength and purity taken together.
- g) "Luminous flux" is a quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye.
- h) "Correlated Colour Temperature" ( $T_c$  [K]): temperature of a Planckian (black body) radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions.
- i) "Colour rendering" means the effect of an illuminant on the colour appearance of objects by conscious or subconscious comparison with their colour appearance under a reference illuminant.
- j) "Luminaire Maintenance Factor" (LMF) means the ratio of the light output ratio of a luminaire at a given time to the initial light output ratio.
- k) "Specific effective radiant UV power" is the effective power of the UV radiation of a lamp related to its luminous flux (unit: mW/klm)

- l) "Ingress protection grade" is a coding system to indicate the degrees of protection provided by an enclosure against access to hazardous parts, ingress of solid foreign objects, ingress of water and to give additional information in connection with such protection.

## 2. DEFINITIONS

- a) "Directional Light Source" (DLS) means light sources having at least 80% light output within a solid angle of  $p$  sr (corresponding to a cone with angle of  $120^\circ$ ).
- b) "White light source" shall mean a light source having chromaticity coordinates that satisfy the following requirement:
- $0,270 < x < 0,530$
  - $-2,3172 \cdot x^2 + 2,3653 \cdot x - 0,2199 < y < -2,3172 \cdot x^2 + 2,3653 \cdot x - 0,1595$
- c) a "rated" value means a quantity value for a characteristic of a product for operating conditions specified in this Regulation or in applicable standards. Unless stated otherwise, all product parameter limits are expressed in rated values.
- d) a "nominal" value means an approximate quantity value used to designate or identify a product.
- e) "Light pollution" means the sum of all adverse impacts of artificial light on the environment, including the impact of obtrusive light.
- f) Obtrusive light means the part of the light from a lighting installation that does not serve the purpose for which the installation was designed. It includes:
- light improperly falling outside the area to be lit,
  - diffused light in the neighbourhood of the lighting installation,
  - sky glow, which is the brightening of the night sky that results from the direct and indirect reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gas molecules, aerosols and particulate matter) in the direction of observation.
- g) "Efficiency Base ballast" (EBb) is defined as a relationship between the rated lamp power ( $P_{lamp}$ ) and the ballast efficiency. It is used for setting certain ballast requirements in Annex III.4 and III.5.

For ballasts for single and double capped fluorescent lamps, it is calculated as follows:

When  $P_{lamp} = 5 \text{ W}$  :  $EBb_{FL} = 0.71$

When  $5 \text{ W} < P_{lamp} < 100 \text{ W}$  :  $EBb_{FL} = P_{lamp} / (2 \cdot \sqrt{P_{lamp}/36} + 38/36 \cdot P_{lamp} + 1)$

When  $P_{lamp} = 100 \text{ W}$  :  $EBb_{FL} = 0.91$

For ballasts for high intensity discharge lamps it is calculated as follows:

When  $P_{\text{lamp}} = 30 \text{ W}$  :  $EBb_{\text{HID}} = 0.80$

When  $30 \text{ W} < P_{\text{lamp}} < 500 \text{ W}$  :  $EBb_{\text{HID}} = P_{\text{lamp}} / (12 * \sqrt{P_{\text{lamp}} / 150} + 156 / 150 * P_{\text{lamp}} + 1)$

When  $P_{\text{lamp}} = 500 \text{ W}$  :  $EBb_{\text{HID}} = 0.92$

- h) the Energy efficiency index (EEI) classifies ballasts for fluorescent lamps without integrated ballasts in classes according to efficiency limit values. The classes for non-dimmable ballasts are A2 BAT, A2, A3, B1, B2 and for dimmable ballasts A1 Bat and A1.

The following table defines the EEI classes for ballasts which are designed to operate the lamps mentioned in the table or other lamps which are designed to be operated by the same ballasts as the lamps mentioned in the table (meaning that the data of the reference ballast is equal).

Table 1

LAMP DATA					BALLAST EFFICIENCY (Plamp / Pinput)					
					Non-dimmable					
Lamp type	Nominal Wattage	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2	
	W		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 G24d=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 G24d=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 G24d=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=1 G24d=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 GX24d=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 GX24d=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 GX24d=3	FSM-26-I-GR10q	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	85,9 %	82,0 %	73,3 %		
T5-E	21	FDH-21-G5-L/P-16/850			20,7	90,2 %	87,3 %	80,5 %		
T5-E	24	FDH-24-G5-L/P-16/550			22,5	90,9 %	88,2 %	81,8 %		
T5-E	28	FDH-28-G5-L/P-16/1150			27,8	90,3 %	87,4 %	82,2 %		



<b>T5-E</b>	<b>35</b>	FDH-35-G5-L/P-16/1450		<b>34,7</b>	<b>92,0 %</b>	<b>89,7 %</b>	<b>83,2 %</b>		
<b>T5-E</b>	<b>39</b>	FDH-39-G5-L/P-16/850		<b>38</b>	<b>92,7 %</b>	<b>90,5 %</b>	<b>84,4 %</b>		
<b>T5-E</b>	<b>49</b>	FDH-49-G5-L/P-16/1450		<b>49,3</b>	<b>91,6 %</b>	<b>89,2 %</b>	<b>84,6 %</b>		
<b>T5-E</b>	<b>54</b>	FDH-54-G5-L/P-16/1150		<b>53,8</b>	<b>92,3 %</b>	<b>90,0 %</b>	<b>85,7 %</b>		
<b>T5-E</b>	<b>80</b>	FDH-80-G5-L/P-16/1150		<b>80</b>	<b>93,0 %</b>	<b>90,9 %</b>	<b>87,0 %</b>		
<b>T5-E</b>	<b>95</b>	FDH-95-G5-L/P-16/1150		<b>95</b>	<b>92,7 %</b>	<b>90,5 %</b>	<b>84,1 %</b>		
<b>T5-E</b>	<b>120</b>	FDH-120-G5-L/P-16/1450		<b>120</b>	<b>92,5 %</b>	<b>90,2 %</b>	<b>84,5 %</b>		
<b>T5-C</b>	<b>22</b>	FSCH-22-L/P-2GX13-16/225		<b>22,3</b>	<b>88,1 %</b>	<b>84,8 %</b>	<b>78,8 %</b>		
<b>T5-C</b>	<b>40</b>	FSCH-40-L/P-2GX13-16/300		<b>39,9</b>	<b>91,4 %</b>	<b>88,9 %</b>	<b>83,3 %</b>		
<b>T5-C</b>	<b>55</b>	FSCH-55-L/P-2GX13-16/300		<b>55</b>	<b>92,4 %</b>	<b>90,2 %</b>	<b>84,6 %</b>		
<b>T5-C</b>	<b>60</b>	FSCH-60-L/P-2GX13-16/375		<b>60</b>	<b>93,0 %</b>	<b>90,9 %</b>	<b>85,7 %</b>		
<b>TC-LE</b>	<b>40</b>	FSDH-40-L/P-2G11		<b>40</b>	<b>91,4 %</b>	<b>88,9 %</b>	<b>83,3 %</b>		
<b>TC-LE</b>	<b>55</b>	FSDH-55-L/P-2G11		<b>55</b>	<b>92,4 %</b>	<b>90,2 %</b>	<b>84,6 %</b>		
<b>TC-LE</b>	<b>80</b>	FSDH-80-L/P-2G11		<b>80</b>	<b>93,0 %</b>	<b>90,9 %</b>	<b>87,0 %</b>		
<b>TC-TE</b>	<b>32</b>	FSMH-32-L/P-2GX24q=3		<b>32</b>	<b>91,4 %</b>	<b>88,9 %</b>	<b>82,1 %</b>		
<b>TC-TE</b>	<b>42</b>	FSMH-42-L/P-2GX24q=4		<b>43</b>	<b>93,5 %</b>	<b>91,5 %</b>	<b>86,0 %</b>		
<b>TC-TE</b>	<b>57</b>	FSM6H-57-L/P-2GX24q=5 FSM8H-57-L/P-2GX24q=5		<b>56</b>	<b>91,4 %</b>	<b>88,9 %</b>	<b>83,6 %</b>		
<b>TC-TE</b>	<b>70</b>	FSM6H-70-L/P-2GX24q=6 FSM8H-70-L/P-2GX24q=6		<b>70</b>	<b>93,0 %</b>	<b>90,9 %</b>	<b>85,4 %</b>		
<b>TC-TE</b>	<b>60</b>	FSM6H-60-L/P-2G8=1		<b>63</b>	<b>92,3 %</b>	<b>90,0 %</b>	<b>84,0 %</b>		
<b>TC-TE</b>	<b>62</b>	FSM8H-62-L/P-2G8=2		<b>62</b>	<b>92,2 %</b>	<b>89,9 %</b>	<b>83,8 %</b>		
<b>TC-TE</b>	<b>82</b>	FSM8H-82-L/P-2G8=2		<b>82</b>	<b>92,4 %</b>	<b>90,1 %</b>	<b>83,7 %</b>		
<b>TC-TE</b>	<b>85</b>	FSM6H-85-L/P-2G8=1		<b>87</b>	<b>92,8 %</b>	<b>90,6 %</b>	<b>84,5 %</b>		
<b>TC-TE</b>	<b>120</b>	FSM6H-120-L/P-2G8=1 FSM8H-120-L/P-2G8=1		<b>122</b>	<b>92,6 %</b>	<b>90,4 %</b>	<b>84,7 %</b>		
<b>TC-DD</b>	<b>55</b>	FSSH-55-L/P-GR10q		<b>55</b>	<b>92,4 %</b>	<b>90,2 %</b>	<b>84,6 %</b>		

In addition to the categories defined in the table:

Non-dimmable ballasts not included in table 1 shall be assigned the following EEI depending on their efficiency:

**Table 2**

$h_{\text{ballast}}$	Energy Efficiency Index
$= 0,94 * EBb_{\text{FL}}$	A3
$= EBb_{\text{FL}}$	A2
$= 1-0,75*(1-EBb_{\text{FL}})$	A2 BAT

Where  $EBb_{\text{FL}}$  is defined in Annex I.2.g.

Dimmable fluorescent lamp ballasts receive the following EEI classes according to which class the ballast would fall when it is operated at the 100% lumen output.

**Table 3**

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

Multi-wattage ballasts shall be classified according to their efficiency under the lowest (worst) efficiency, or for each operated lamp a relevant class shall be indicated.

- i) "Second lamp envelope" shall mean a second outer lamp envelope which is not required for the production of light, such as an external sleeve for preventing mercury and glass release into the environment in case of lamp breakage.
- j) "Utilization Factor" (UF) of an installation for a reference surface is defined as the ratio of the luminous flux received by the reference surface to the sum of the individual total fluxes of the lamps of the installation.
- k) "Light source control gear" means one or more components between the supply and one or more light sources which may serve to transform the supply voltage, limit the current of the lamp(s) to the required value, provide starting voltage and preheating current, prevent cold starting, correct power factor or reduce radio interference. Ballasts, halogen convertors and transformers and Light Emitting Diode (LED) drivers are examples of light source control gears.

- l) "high-pressure mercury (vapour) lamp" is a high intensity discharge lamp in which the major portion of light is produced, directly or indirectly, by radiation from mercury operating at a partial pressure in excess of 100 kilopascals.
- m) "high-pressure sodium (vapour) lamp" is a high intensity discharge lamp in which the light is produced mainly by radiation from sodium vapour operating at a partial pressure of the order of 10 kilopascals.
- n) "metal halide lamp" is a high intensity discharge lamp in which the light is produced by radiation from a mixture of metallic vapour, metal halides and the products of the dissociation of metal halides.
- o) "electronic or high frequency ballast" means a mains supplied a.c. to a.c. inverter including stabilizing elements for starting and operating one or more tubular fluorescent lamps, generally at high frequency.

**ANNEX II**  
**General exemptions**

**1. THE FOLLOWING LAMPS SHALL BE EXEMPTED FROM THE PROVISIONS OF THIS REGULATION:**

- a) lamps that are not white light sources as defined in Annex I. This exemption does not apply to high pressure sodium lamps.
- b) lamps that are directional light sources as defined in Annex I
- c) lamps not intended for use in general lighting applications and lamps incorporated into other products not providing a general lighting function
- d.) All lamps having:
  - 6% or more of total radiation of the range 250-780 nm in the range of 250-400 nm
  - 11% or more of total radiation of the range 250-780 nm in the range of 630-780 nm
  - 5% or more of total radiation of the range 250-780 nm in the range of 640-700 nm
  - the maximum of total radiation between 315 - 400 nm (UVA) or 280 - 315 nm (UVB)
- e.) Double capped fluorescent lamps lamps having:
  - a diameter of 7mm (T2) and less
  - a diameter of 16 mm (T5) and lamp power  $P < 13W$  and  $P > 80W$
  - a diameter of 16 mm (T5) 2G11 4 pin base,  $T_c = 3200K$  with chromaticity coordinates  $x=0.415$   $y=0.377$  and  $T_c = 5500K$  with chromaticity coordinates  $x=0.330$   $y=0.335$
  - a diameter of 38mm (T12), lamp cap G-13 Medium BiPin base, +/-5m (+magenta,- green) color compensating filter value limit (cc). CIE coordinates  $x=0.330$   $y=0.335$  and  $x=0.415$   $y=0.377$
  - a diameter of 38mm (T12) and equipped with an external ignition strip
- f.) Metal Halide lamps with  $T_c > 7000K$
- g.) Metal Halide lamps having a specific effective UV output  $> 2mW/kLm$
- h) Metalhalide lamps not having lamp cap E27, E40

**2. THE FOLLOWING LUMINAIRES SHALL BE EXEMPTED:**

- a) Emergency lighting luminaires and emergency sign luminaires within the meaning of Directive 73/23/EEC
- b) Luminaires covered by the requirements of Directives 94/9/EC<sup>1</sup>, 1999/92/EC<sup>2</sup>, 2006/42/EC<sup>3</sup>, 93/42/EEC<sup>4</sup>, 88/378/EEC<sup>5</sup> and luminaires integrated into equipment covered by these requirements.

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<sup>1</sup> Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres, OJ L 100, 19.4.1994, p. 1

<sup>2</sup> Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres, OJ L 23, 28.1.2000, p. 57

<sup>3</sup> Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast), OJ L 157, 09/06/2006 P. 0024 - 0086

<sup>4</sup> Council Directive 93/42/EEC of 14 June 1993 concerning medical devices, OJ L 169, 12/07/1993 P. 0001 – 0043

<sup>5</sup> Council Directive 88/378/EEC of 3 May 1988 on the approximation of the laws of the Member States concerning the safety of toys, Official Journal L 187, 16/07/1988 P. 0001 - 0013

**ANNEX III**  
**Ecodesign requirements for fluorescent and high intensity discharge lamps and ballasts**  
**and luminaires built for such lamps**

**1. PRODUCT INFORMATION REQUIREMENTS FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR HIGH INTENSITY DISCHARGE LAMPS**

One year after the entry into force of this Regulation, manufacturers shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their fluorescent lamps without integrated ballast and each of their high intensity discharge lamps.

For the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC, the technical documentation file shall contain the information listed below.

- 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 2000h, 4000 h, 6000 h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h 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 2000h, 4000 h, 6000h, 8000h, 12000 h, 16000 h and 20000 h (up to 8000h 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) Rated lamp mercury content rounded off to 0,5 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 maximize its luminous flux. If the lamp does not fulfill at least 90% of the respective luminous efficacy requirement in Annex III Part 2 at an ambient temperature of 25°C (100% for T5 lamps), it should be stated that the lamp is not suitable for indoor use at standard room temperatures.

**2. REQUIREMENTS ON THE EFFICACY OF FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND OF HIGH INTENSITY DISCHARGE LAMPS**

*A. First stage requirements*

One year after the entry into force of this Regulation:

Double capped fluorescent lamps of 16 mm and 26 mm diameter (T5 and T8 lamps) shall have at least the following rated luminous efficacies at 25°C.

**Table 4**

<b>T8 (26 mm Ø)</b>		<b>T5 (16 mm Ø) High Efficiency</b>		<b>T5 (16 mm Ø) High Output</b>	
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				

For practical reasons, it is necessary to measure the T5 lamps at an ambient temperature of 25°C; they reach their optimum efficiency at 35°C (increase by factor of 1,1).

In case the nominal wattages are different from those listed above:

Lamps must reach the luminous efficacy of the nearest equivalent in terms of wattage, except T8 lamps above 50W which must reach a luminous efficacy of 83 lm/W.

Single capped fluorescent lamps shall have the following rated luminous efficacies at 25°C.

Table 5

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	50	10	60	13	69
7	57	13	69	18	67
9	67	18	67	26	66
11	82	26	66	32	75
				42	76
				57	75
				70	74



Table 6


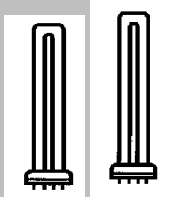
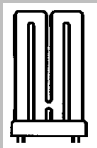



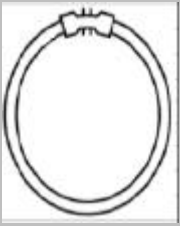
Four parallel tubes, lamp cap GX24q (4 pin)		Long single parallel tube, lamp cap 2G11 (4 pin)		4 legs in one plane, lamp cap 2G10 (4 pin)	
					
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
57	75	18	61	18	67
70	74	24	71	24	75
		36	78	34	82
				36	81
				40	83
				55	82
				80	75

Table 7

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		

**Table 8**

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

Corrections applicable to both single and double capped fluorescent lamps

The required luminous efficacy at 25°C may be lower than required in the tables above in the following cases:

**Table 9**

Lamp parameter	Authorized deduction from luminous efficacy at 25°C
Tc = 5000K	- 10%
95 > Ra > 90	- 20%
Ra > 95	- 30%
Second lamp envelope	- 10%

The indicated deductions are cumulative.

Single and double capped fluorescent lamps that do not have their optimum temperature at 25°C must still comply at their optimum temperature with the luminous efficacy requirements as set out in the tables above.

High intensity discharge lamps shall have at least the following rated luminous efficacies:

**Table 10**

Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W]
$W = 40$	50
$40 < W = 50$	55
$50 < W = 70$	65
$70 < W = 125$	70
$125 < W = 400$	75

Lamps equipped with a second lamp envelope have to fulfil 90% of the applicable lamp efficacy requirements.

*B. Second stage requirements*

Three years after the entry into force of this Regulation, fluorescent lamps without integrated ballast and high-intensity discharge lamps shall have the following efficacies.

Double capped fluorescent lamps

The requirements applicable to double capped fluorescent lamps 26 mm in diameter (T8) lamps in the first stage shall be applicable to all double capped fluorescent lamps of other wattages and diameters than those defined in the first stage and in the exemptions.

For other diameters or wattages the lamp must reach the minimum value of the nearest equivalent lamp with regards to wattage and/or diameter.

The corrections defined under the first stage continue to apply.

High Pressure Sodium lamps shall have at least the following rated luminous efficacies:

**Table 11**

Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W] - Clear	Rated Lamp Efficacy [lm/W] - Coated
$W = 45$	= 60	= 60
$45 < W = 55$	= 80	= 70
$55 < W = 75$	= 90	= 80
$75 < W = 105$	= 100	= 95
$105 < W = 155$	= 110	= 105
$155 < W = 255$	= 125	= 115
$255 < W = 605$	= 135	= 130

High pressure sodium lamps with  $60 < Ra = 80$  - must meet the efficacies indicated in Table 12.

Until 6 years after the entry into force of this regulation, high pressure sodium retrofit lamps designed to operate on high pressure mercury vapour lamp control gear shall be exempted from the requirements in Table 11. 6 years after the entry into force of this regulation, they shall comply with the requirements in Table 11.

Metal Halide lamps shall have at least the following rated luminous efficacies:

**Table 12**

Nominal Lamp Wattage [W]	Rated Lamp Efficacy [lm/W] - Clear	Rated Lamp Efficacy [lm/W] - Coated
W = 55	= 60	= 60
55 < W = 75	= 75	= 70
75 < W = 105	= 80	= 75
105 < W = 155	= 80	= 75
155 < W = 255	= 80	= 75
255 < W = 405	= 85	= 75

Metal Halide lamps with Ra > 80 are exempted from the requirements in Table 12.

The correction defined under the first stage continues to apply to all high-intensity discharge lamps.

*C. Third stage requirements*

Eight years after the entry into force of this Regulation:

Fluorescent lamps without integrated ballast shall be designed to operate with high frequency ballasts only.

Metal Halide lamps shall have at least the following rated luminous efficacies:

**Table 13**

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W) - Clear	Rated Lamp Efficacy (lm/W) - Coated
W = 55	= 70	= 65
55 < W = 75	= 80	= 75
75 < W = 105	= 85	= 80
105 < W = 155	= 85	= 80
155 < W = 255	= 85	= 80
255 < W = 405	= 90	= 85

The correction defined under the first stage continues to apply to all high-intensity discharge lamps.

All high-pressure sodium and metal halide lamps above 9000 lm luminous flux shall be clear lamps.

**3. REQUIREMENTS ON THE LAMP PERFORMANCE FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR HIGH INTENSITY DISCHARGE LAMPS**

One year after the entry into force of this Regulation:

Fluorescent lamps without integrate ballast covered by the requirements of Annex III.2 shall have a colour rendering index (CRI) of at least 80.

Three years after the entry into force of this Regulation:

Fluorescent lamps without integrated ballast shall have the following lamp lumen maintenance factors:

**Table 14**

Lamp lumen maintenance factor	Burning hours			
	2000	4000	8000	16000
Lamp types				
Double-Capped Fluorescent lamps operating on non-high frequency ballasts	0.95	0.92	0.90	-
Double-Capped Fluorescent lamps on high frequency ballast with warmstart	0.97	0.95	0.92	0.90
Single-Capped Fluorescent lamps operating on non-high frequency ballasts	0.95	0.90	0.80	-
Single-Capped Fluorescent lamps on high frequency ballast with warmstart	0.97	0.90	0.80	-

Fluorescent lamps without integrated ballast shall have the following lamp survival factors:

**Table 15**

Lamp survival factor	Burning hours			
	2000	4000	8000	16000
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
Single-Capped Fluorescent lamps operating on non-high frequency ballasts	0.95	0.92	0.50	-
Single-Capped Fluorescent lamps on high frequency ballast with warmstart	0.95	0.90	0.87	-

High pressure sodium lamps shall have the following lamp lumen maintenance factors and lamp survival factors:

**Table 16**

Burning hours	Lamp lumen maintenance factor	Lamp survival factor
12000 h (P = 75 W)	> 0.80	> 0.90
16000 h (P > 75 W)	> 0.85	> 0.90

Eight years after the entry into force of this Regulation:

Metal halide lamps shall have the following lamp lumen maintenance factors and lamp survival factors:

**Table 17**

Burning Hours	Lamp lumen maintenance factor	Lamp survival factor
12000	> 0.80	> 0.80

#### **4. PRODUCT INFORMATION REQUIREMENTS FOR BALLASTS FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR HIGH INTENSITY DISCHARGE LAMPS**

Manufacturers of ballasts shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their ballast models.

For the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC, the technical documentation file shall contain the information listed below.

One year after the entry into force of this Regulation:

For ballasts for fluorescents lamps, the energy efficiency index (EEI) class defined in Annex I.2.h (also affixed in a non-detachable form to the ballast).

Three years after the entry into force of this Regulation:

For ballasts for high intensity discharge lamps, the efficiency of the ballast as defined in Annex I.1.d (also affixed in a non-detachable form to the ballast).

## **5. REQUIREMENTS ON THE PERFORMANCE OF BALLASTS FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR HIGH INTENSITY DISCHARGE LAMPS**

Multiwattage ballasts shall comply with the requirements below according to each wattage on which they operate.

### *A. First stage requirements*

One year after this Regulation comes into force:

Minimum EEI class shall be B2 for the ballasts covered by table 1 in Annex I.3.e, A3 for the ballasts covered by table 2, and A1 for dimmable ballasts according to table 3.

At the dimming position corresponding to 25% of the lumen output of the operated lamp, the input power of the lamp-ballast circuit shall not exceed:

$$P_{in} < 50\% * P_{Lrated} / \eta_{ballast}$$

Where  $P_{Lrated}$  is the rated lamp power and  $\eta_{ballast}$  is the minimum energy efficiency limit of the respective EEI class.

In addition, the power consumption of the above mentioned ballasts shall not exceed 1,0 W when operated lamps do not emit any light in normal operating conditions (<1 % light output). This requirement shall apply to ballasts when other possible connected components (network connections, sensors etc.) are disconnected.

### *B. Second stage requirements*

Three years after the implementing measure comes into force:

Ballasts for high intensity discharge lamps shall have the efficiency:

$$n_{ballast} = EBbHID - 0,05$$

The power consumption of ballasts used with fluorescent lamps without integrated ballast shall not exceed 0,5 W when operated lamps do not emit any light in normal operating conditions (<1 % light output). This requirement shall apply to ballasts when other possible connected components (network connections, sensors etc.) are disconnected.

### *C. Third stage requirements*

Eight years after this Regulation comes into force:

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

$$n_{ballast} = EBbFL.$$

Ballasts for high intensity discharge lamps below or equal to 100 Watt rated lamp power shall have an efficiency of at least 87 % at full power and at least 94 % for lamps above 100W rated power, except if the ballasts for lamps above 100W rated power are dimmable in at least five steps down to 50 % lamp power, in which case their efficiency shall be at least 89%.

## **6. PRODUCT INFORMATION REQUIREMENTS FOR LUMINAIRES FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR LUMINAIRES FOR HIGH INTENSITY DISCHARGE LAMPS**

One year after this Regulation comes into force:

Manufacturers of luminaires (both for fluorescent lamps without integrated ballast and for high intensity discharge lamps) with total lamp lumen above 2000 lumen shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their luminaire models.

For the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC, the technical documentation file shall contain the information listed below.

- a) If the luminaire is sold together with the ballast, information on the efficiency of the ballast according to Annex III.4, in accordance with the ballast manufacturer's data.
- b) If the luminaire is sold together with the lamp, lamp efficacy (lm/W) of the lamp, in accordance with the lamp manufacturer's data.
- c) If the ballast or the lamp is not sold together with the luminaire, references used in manufacturers' catalogues must be provided on the types of lamps or ballasts compatible with the luminaire (e.g. ILCOS code for the lamps).
- d) Realistic maintenance instructions to ensure that the luminaire maintains, as nearly as possible, its original quality throughout its lifetime.
- e) Disassembly instructions
- f) Luminaires for high intensity discharge lamps with total lamp lumen above 9000 lumen shall indicate that they are designed for clear glass lamps.

Information to be affixed in a non-detachable form to each luminaire :

- g) Model and product number to find all technical data in the manufacturers catalogue (printed or electronic).

## **7. REQUIREMENTS ON THE ENERGY PERFORMANCE OF LUMINAIRES FOR FLUORESCENT LAMPS WITHOUT INTEGRATED BALLAST AND FOR LUMINAIRES FOR HIGH INTENSITY DISCHARGE LAMPS**

### *A. First stage requirements*

One year after this Regulation comes into force:

The power consumption of the above mentioned luminaires shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are operating do not emit any light (<1 %) (see ballast requirements) and any additional sensors are disconnected.



### *B. Second stage requirements*

Three years after this Regulation comes into force:

Luminaires for fluorescent lamps without integrated ballast and for high intensity discharge lamps shall be compatible with ballasts complying with Annex III.4.C, except plastic luminaires with ingress protection grade at least IP4X.

Luminaires for high intensity discharge lamps with total lamp lumen above 9000 lumen shall be designed for clear glass lamps.

The power consumption of luminaires for fluorescent lamps without integrated ballast and for high intensity discharge lamps shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are operating do not emit any light (<1 %) (see ballast requirements) and any additional sensors are disconnected..

### *C. Third stage requirements*

Eight years after this Regulation comes into force:

All luminaires for fluorescent lamps without integrated ballast and for high intensity discharge lamps shall be compatible with ballasts complying with Annex III.4.C.

## ANNEX IV

### Indicative benchmarks for fluorescent and high intensity discharge products

At the time of adoption of this Regulation, the following values can be considered as benchmarks for the products concerned.

#### Lamp efficacy and lamp life:

For single and double capped fluorescent lamps, the benchmark values are the best values included in the tables in Annex III Parts 2 and 3.

#### For high-intensity discharge lamps:

Metal Halide Lamps (clear and frosted):

**Table 18**

	<b>Ra = 80</b>	<b>80 &gt; Ra = 60</b>
<b>Nominal Lamp Wattage [W]</b>	<b>Rated Lamp Efficacy [lm/W]</b>	<b>Rated Lamp Efficacy [lm/W]</b>
W=55	=80	=95
55<W=75	=90	=113
75<W=105	=90	=116
105<W=155	=98	=117
155<W=255	=105	
255<W=405	=105	
<b>Burning Hours</b>	<b>Lamp Lumen Maintenance Factor</b>	<b>Lamp Survival Factor</b>
12000	>0,80	>0,80

High-pressure sodium lamps (clear and frosted) :

**Table 19**

	<b>Nominal Lamp Wattage [W]</b>	<b>Rated Lamp Efficacy [lm/W]</b>
	W=55	=88
	55<W=75	=91
	75<W=105	=107
	105<W=155	=110
	155<W=255	=128
	255<W=405	=138
<b>Burning Hours</b>	<b>Lamp Lumen Maintenance Factor</b>	<b>Lamp Survival Factor</b>
16000	>0,94	>0,92

#### Lamp mercury content:

On the basis of information gathered during the preparation of the measure, it was noted that quality fluorescent lamps without integrated ballast typically contain 5 mg of mercury, and the best on the market not more than 1,4 mg. The mercury content of high-intensity discharge

lamps is much more varied, but a quality lamp used in street lighting does not contain more than 20 mg and the best high intensity discharge lamps have 12 mg.

### **Ballast performance**

For applications where dimming is beneficial, the benchmarks are as follows:

Fluorescent lamp ballasts with  $n_{ballast} = 0,93$  that are dimmable in at least 3 % steps down to 10 % light output.

HID lamp ballasts with  $n_{ballast} = 0,9$  that are dimmable in at least 5 % steps down to 40 % lamp power (best known result, actual dimming possibilities may depend on the HID lamp type used with the ballast).

### **Luminaire product information**

The following product information is provided on free-access websites and in other forms the manufacturers deem appropriate for benchmark luminaires in addition to the provisions in Annex III.6:

CEN flux code of the luminaire or the complete photometric file.

## ANNEX V

### Indicative benchmarks for products to be installed as fixed lighting in office task areas

#### 1. PRODUCT INFORMATION FOR LAMPS

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for lamps:

Those of fluorescent lamps in Annex III.1.

#### 2. LAMP PERFORMANCE

Lamps have an efficacy according to Annex IV.

These lamps have the following lamp lumen maintenance factors (LLMF) and lamp survival factors (LSF):

**Table 20**

<b>Burning hours</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>	<b>16000</b>
<b>LLMF</b>	0.97	0.93	0.90	0.90
<b>LSF</b>	0.99	0.99	0.98	0.93

In addition, these lamps are dimmable to at least 10 % of their full power.

#### 3. PRODUCT INFORMATION FOR LIGHT SOURCE CONTROL GEAR

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for light source control gear:

Information on the efficiency of the ballast or the applicable type of light source control gear.

#### 4. LIGHT SOURCE CONTROL GEAR PERFORMANCE

Fluorescent lamp ballasts have an energy efficiency index of at least A2 (BAT) according to Annex III.4 and are dimmable.

High intensity discharge lamp ballasts have an efficiency of 88 % (= 100 Watt lamp power) and else 90 % and are dimmable if the sum of lamp powers operated on the same ballast is above 50 Watt.

Any other types of light source control gear have an efficiency of 88 % (= 100 Watt input power) and else 90 % when measured according to the applicable measurement standards and are dimmable for lamps above total input power 55 Watt.

## 5. PRODUCT INFORMATION ON LUMINAIRES

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for each of the luminaire models:

Those of luminaires in Annex III.6 and Annex IV.

In addition, for all luminaires excluding the so-called 'bare batten' or 'strip' luminaires, applicable luminaire maintenance factor (LMF) value data is provided with cleaning instructions if needed up to 4 years, according to CIE 97 (2007) on 'The maintenance of indoor lighting systems', using a similar table:

**Table 21**

LMF values							
Environment	cleaning intervals in years						
	1,0	1,5	2,0	2,5	3,0	3,5	4,0
Very Clean							
Clean							
Normal (optional)							
Dirty (optional)							

The table should be accompanied by a disclaimer that it contains only indicative values that may not reflect the achievable maintenance values in a particular installation.

For luminaires for directional light sources such as reflector lamps or LEDs, only the applicable information should be provided, e.g. LLMF x LMF instead of simply the LMF.

## 6. LUMINAIRE PERFORMANCE

Luminaires have a luminaire maintenance factor  $LMF > 0.95$  in normal office pollution degrees with a cleaning cycle of 4 years.

If they are fluorescent or HID lamp luminaires, they are compatible with at least one lamp type complying with the benchmarks of Annex IV.

In addition, these luminaires are compatible with lighting control systems offering the following features:

- presence detection
- light responsive dimming (for daylight and/or room reflectance variations)
- dimming to accompany changes in illumination requirements (during the working day, over a longer period or due to changes in functionality)

- dimming to compensate for: luminaire pollution, changes in lamp lumen output over its life time and changes in lamp efficacy when the lamp is replaced.

The compatibility can also be ensured by incorporating the appropriate components in the luminaires themselves.

The compatibility or the features offered by the incorporated components is indicated in the luminaire's product documentation.

## ANNEX VI

### Indicative benchmarks for products to be installed as public street lighting

#### 1. PRODUCT INFORMATION FOR LAMPS

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for lamps :

Those of high intensity discharge lamps in Annex III.1.

#### 2. LAMP PERFORMANCE

Lamps have an efficacy according to Annex IV.

These lamps have the following lamp lumen maintenance factors (LLMF) and lamp survival factors (LSF):

**Table 22**

<b>Burning hours</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>	<b>16000</b>
<b>LLMF</b>	0.98	0.97	0.95	0.92
<b>LSF</b>	0.99	0.98	0.95	0,92

In addition, these lamps are dimmable to at least 50 % of their full power when the rated lamp lumen output is above 9000 lumen.

#### 3. PRODUCT INFORMATION FOR LIGHT SOURCE CONTROL GEAR

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for light source control gear:

Information on the efficiency of the ballast or the applicable type of light source control gear.

#### 4. LIGHT SOURCE CONTROL GEAR PERFORMANCE

Fluorescent lamp ballasts have an energy efficiency index of at least A2 (BAT) according to Annex III.4 and are dimmable.

High intensity discharge lamp ballasts have an efficiency of above 87 % (= 100 Watt lamp power) and else above 89 % measured according to Annex I and are dimmable if the sum of lamp powers operated on the same ballast is above or equal to 55 W..

Any other types of light source control gear have an efficiency of above 87 % (= 100 Watt input power) and else above 89 % when measured according to the applicable measurement standards and are dimmable for lamps equal or above total input power 55 W.

## 5. PRODUCT INFORMATION ON LUMINAIRES

The following information is provided on free-access websites and in other forms the manufacturers deem appropriate for the relevant models:

- a) Those of luminaires in Annex III.6 and Annex IV.
- b) Utilization Factor values for standard road conditions in tabular form for the defined road class. The table shall contain the most energy efficient UF values for different road widths, different pole heights, maximum pole distances, luminaire overhang and inclination, as appropriate for the given road class and luminaire design.
- c) Installation instructions for optimizing the Utilization Factor.
- d) Additional installation recommendations to minimize obtrusive light (if not conflicting with UF optimization and safety).
- e) e.) For all luminaires excluding the so-called 'bare batten' or 'strip' luminaires, applicable luminaire maintenance factor (LMF) value data is provided according to CIE 154 (2003) on 'The maintenance of outdoor lighting systems', using a similar table:

**Table 23**

LMF values							
Pollution category	Exposure time in years						
	1,0	1,5	2,0	2,5	3,0	3,5	4,0
High							
Medium							
Low							

For luminaires for directional light sources such as reflector lamps or LEDs, only the applicable information should be provided, e.g. LLMF x LMF instead of simply the LMF.

## 6. LUMINAIRE PERFORMANCE

Luminaires have an optical system that has an ingress protection rating as follows:

- IP65 for road classes ME1 to ME5 and MEW1 to MEW5
- IP5x for road classes CE0 to CE5, S1 to S6, ES, EV and A

The proportion of the light emitted by an optimally installed luminaire going above the horizon should be limited to:



**Table 24**

<b>Road classes ME1 to ME5 and MEW1 to MEW5, all lumen outputs</b>	<b>3%</b>
<b>Road classes CE0 to CE5, S1 to S6, ES, EV and A</b>	
12000 lm = light source	<b>5%</b>
8500 lm = light source < 12000 lm	<b>10%</b>
3300 lm = light source < 8500 lm	<b>15%</b>
light source < 3300 lm	<b>20%</b>

In areas where light pollution is of concern, the maximum proportion of the light going above the horizon should not be more than 1% for all road classes and lumen outputs.

Luminaires should be designed so that they avoid emitting obtrusive light to the maximum extent. However, any improvement of the luminaire aiming at reducing the emission of obtrusive light should not be to the detriment of the overall energy efficiency of the installation for which it is designed for.

If they are luminaires for fluorescent or HID lamps, they are compatible with at least one lamp type complying with the benchmarks of Annex IV.

Luminaires are compatible with installations equipped with appropriate dimming and control systems that take account of daylight availability, traffic and weather conditions, and also compensate for the variation over time in surface reflection and for the initial dimensioning of the installation due to the lamp lumen maintenance factor.

**ANNEX VII**  
**Verification procedure for market surveillance purposes**

When performing the market surveillance checks referred to in Directive 2005/32/EC, Article 3 (2), the authorities of the Member States shall apply the following verification procedure for the requirements set out in Annex III Parts 1, 2, 3, 4, 5 and 7.

For lamps:

Member State authorities shall test a sample batch of minimum twenty lamps by manufacturer, randomly selected from at least four different points of sale.

The batch shall be considered to comply with the provisions set out in Annex III, Parts 1, 2 and 3 as applicable, of this Regulation if the average results of the batch do not vary from the limit, threshold or declared values by more than 10%.

Otherwise, the model shall be considered not to comply.

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 4, 5 and 7, as applicable, of 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.