



CABINET OF MINISTERS OF UKRAINE
RESOLUTION

No. 741 of 14 August 2019
Kyiv

On Approval of the Technical Regulation on Ecodesign Requirements for Fluorescent Lamps without Integrated Ballast, for High Intensity Discharge Lamps, and for Ballasts and Luminaires Able to Operate Such Lamps

In accordance with [Article 5](#) of the Law of Ukraine ‘On Technical Regulations and Conformity Assessment’, the Cabinet of Ministers of Ukraine hereby **resolves**:

1. To approve the [Technical Regulation on Ecodesign Requirements for Fluorescent Lamps without Integrated Ballast, for High Intensity Discharge Lamps, and for Ballasts and Luminaires Able to Operate Such Lamps](#), as attached to the original.
2. The State Agency on Energy Efficiency and Energy Saving shall provide for the implementation of the Technical Regulation approved by this Resolution.
3. To introduce to the [list of types of products subject to state market surveillance by state market surveillance authorities](#), approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1069 of 28 December 2016 (Official Journal of Ukraine, 2017, No. 50, p. 1550), amendment, as attached.
4. This Resolution shall enter into force after six months following its publication.

Prime Minister of Ukraine

VOLODYMYR GROYSMAN

Ind. 21

APPROVED
by the Resolution of the Cabinet of Ministers of Ukraine
No. 741 of 14 August 2019

AMENDMENT
to be introduced to the list of types of products subject to state
market surveillance by state market surveillance authorities

The **list** shall be supplemented with point 33¹ to read as follows:

‘33¹. Fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires able to operate such lamps Resolution of the Cabinet of Ministers State Service of Ukraine on Food Safety and Consumer Protection’ of Ukraine No. 741 of 14 August 2019
‘On Approval of the Technical Regulation on Ecodesign Requirements for Fluorescent Lamps without Integrated Ballast, for High Intensity Discharge Lamps, and for Ballasts and Luminaires Able to Operate Such Lamps’

{The text of the Technical Regulation was taken from the official website of the Cabinet of Ministers of Ukraine}

TECHNICAL REGULATION
on Ecodesign Requirements for Fluorescent Lamps without Integrated Ballast,
for High Intensity Discharge Lamps, and for Ballasts and Luminaires Able to
Operate Such Lamps

General part

1. This Technical Regulation establishes ecodesign requirements for the placing on the market of fluorescent lamps without integrated ballast, of high intensity discharge lamps, and of ballasts and luminaires able to operate such lamps, including those that are integrated into other energy-using products.

This Technical Regulation also provides indicative benchmarks for appliances intended for use in office lighting and public street lighting.

This Technical Regulation is based on the 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.

This Technical Regulation shall not apply to products listed in Annex 1.

2. In this Technical Regulation, the terms below shall be used in the following meaning:

‘ballast’ means a device intended 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);

‘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 flow, traffic safety, and public security;

‘general lighting’ means substantially uniform lighting of an area without provision for special local requirements;

‘discharge lamp’ means a lamp in which the light is produced, directly or indirectly, by an electric discharge through a gas, a metal vapour or a mixture of several gases and vapours;

‘high intensity discharge lamps’ means electric discharge lamps in which the light producing arc is stabilised by wall temperature and the arc has a bulb wall loading in excess of $3\text{W}/\text{cm}^2$;

‘fluorescent lamps’ means 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 lamp without integrated ballast’ means single and double capped fluorescent lamps without integrated ballast;

‘office lighting’ means a fixed lighting installation for office work intended to enable people to perform visual tasks efficiently and accurately;

‘luminaire’ means 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 and, where necessary, circuit auxiliaries together with the means for connecting them to the supply, but not the light sources themselves.

The definitions that are used in Annex 1 and Annexes 3 to 7 to this Technical Regulation shall be set out in Annex 2.

Other terms shall have the meanings set out in the Laws of Ukraine ‘On Technical Regulations and Conformity Assessment’, ‘On State Market Surveillance and Control of Non-Food Products’, ‘On Standardization’ and in the Technical Regulation Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products, approved by the Resolution of the Cabinet of Ministers of Ukraine No 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No 80, p. 2678), the Technical Regulation on Energy Labelling of Electrical Lamps and Luminaires, approved by the Resolution of the Cabinet of Ministers of Ukraine No 340 of 27 May 2015 (Official Journal of Ukraine, 2015, No 44, p. 1387).

Ecodesign requirements

3. The ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps are set out in Annex 3.

Conformity assessment

4. Conformity of fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps with the requirements of this Technical Regulation shall be assessed by applying the internal

design control procedure or the management system for assessing conformity set out, respectively, in Annexes 4 and 5 to the Technical Regulation Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products, approved by the Resolution of the Cabinet of Ministers of Ukraine No 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No 80, p. 2678).

For the purposes of conformity assessment, the technical documentation shall contain a copy of the calculations as laid down in point 3 of section I, point 2 of section II and point 2 of section III of Annex 3.

State market surveillance

5. Verification of conformity of the characteristics of fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires able to operate such lamps with the requirements of this Technical Regulation in the course of state market surveillance shall be made in accordance with the requirements laid down in Annex 4.

Indicative benchmarks

6. The indicative benchmarks for best-performing products and technology available on the market are identified:

in Annex 5 for fluorescent lamps without integrated ballast, for high intensity discharge lamps and for ballasts and luminaires able to operate such lamps;

in Annexes 6 and 7 for products intended for use in office lighting or in public street lighting.

Correlation table

7. The correlation table of the provisions of the 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 of this Technical Regulation is set out in Annex 8.

EXEMPTIONS

1. The provisions of Annex 3 shall not apply to the following lamp types, provided that the technical documentation file drawn up for the purposes of conformity assessment states which of the technical parameters listed hereunder provides a basis for their exemption:

1) lamps that are not white light sources as defined in Annex 2 (this exemption does not apply to high pressure sodium lamps);

2) lamps that are directional light sources as defined in Annex 2;

3) blended high intensity discharge lamps having:

6 % or more of total radiation of the range 250-780 nm in the range of 250-400 nm, and

11 % or more of total radiation of the range 250-780 nm in the range of 630-780 nm, and

5 % or more of total radiation of the range 250-780 nm in the range of 640-700 nm;

4) blended high intensity discharge lamps having:

the peak of the radiation between 315-400 nm (UVA) or 280-315 nm (UVB);

5) double capped fluorescent lamps having:

a diameter of 7 mm (T2) and less,

a diameter of 16 mm (T5) and lamp power $P \leq 13$ W or $P > 80$ W,

a diameter of 38 mm (T12), lamp cap G-13 Medium BiPin base, ± 5 m (+magenta, -green) colour compensating filter value limit, (cc). Chromaticity coordinates: $x=0,330$ $y=0,335$, $x=0,415$ $y=0,377$;

a diameter of 38 mm (T12) and equipped with an external ignition strip;

6) single capped fluorescent lamps having a diameter of 16 mm (T5), 2G11 4 pin base, $T_c = 3200$ K with chromaticity coordinates $x=0,415$ $y=0,377$ and $T_c = 5500$ K with chromaticity coordinates $x=0,330$ $y=0,335$;

7) high intensity discharge lamps with $T_c > 7000$ K;

8) high intensity discharge lamps having a specific effective UV output $UV_{output} > 2$ mW/klm;

9) high-intensity discharge lamps not having lamp cap E27, E40, PGZ12.

2. The provisions of Annex 3 shall not apply to the following products, provided that in all forms of product information it is stated that they are not intended for general lighting use within the meaning of this Technical Regulation, or when they are intended for use in applications listed in subpoints 2 to 5 of this Point:

1) products not intended for general lighting or products incorporated into products which do not provide a general lighting function;

2) lamps used in equipment and protective systems intended for use in potentially explosive atmospheres;

3) emergency lighting luminaires and emergency sign luminaires;

4) ballasts intended for use in luminaires referred to in subpoint 3 of point 2 of this Annex and designed to operate lamps in emergency conditions;

5) luminaires covered by the requirements for:

equipment and protective systems intended for use in potentially explosive atmospheres;

equipment of machinery, mechanisms and their components;

medical appliances, devices and equipment;

equipment used in toys;

and luminaires integrated into equipment covered by these requirements.

3. The intended purpose of each product shall be stated in the instructions. The technical documentation file shall be drawn up for the purposes of conformity assessment, listing the technical parameters that make the product design specific for the stated intended purpose.

**TECHNICAL PARAMETERS AND DEFINITIONS,
for the purposes of Annexes 1 and 3 to 7 of the Technical Regulation**

1. Technical parameters for ecodesign requirements

1) ‘luminous efficacy of a source’, ‘light source efficacy’ or ‘lamp efficacy’ (η_{source}) shall be calculated in lm/W according to the following formula:

$$\eta_{source} = \frac{\Phi}{P_{source}};$$

where Φ is the quotient of the luminous flux,

P_{source} is the power consumed by the light source;

2) the power dissipated by auxiliary equipment such as ballasts is not included in the power consumed by the source;

3) ‘lamp lumen maintenance factor’ (LLMF) is the ratio of the luminous flux emitted by the lamp at a given time in its life to the initial luminous flux;

4) ‘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;

For the purposes of Annex 3, the LSF shall be measured in high frequency operating mode with a switching cycle of 11h/1h.

5) ‘ballast efficiency’ ($\eta_{ballast}$) 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;

6) ‘chromaticity’ means the property of a colour stimulus defined by its chromaticity coordinates, or by its dominant or complementary wavelength and purity taken together;

7) ‘luminous flux’ means a quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye;

8) ‘correlated colour temperature’ (T_c [K]) means 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;

9) colour rendering (Ra) 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;

10) 'specific effective radiant UV power' means the effective power of the UV radiation of a lamp related to its luminous flux (unit: mW/klm);

11) 'ingress protection grading' means a coding system to indicate the degree of protection against ingress of dust, solid objects and moisture and to give additional information in connection with such protection.

2. Technical parameters for indicative benchmarks

1) 'lamp mercury content' means the amount of mercury contained in the lamp;

2) '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;

3) 'Utilisation Factor' (UF) of an installation on a reference surface means 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.

3. Definitions

1) 'Directional Light Source' (DLS) means light source having at least 80 % light output within a solid angle of π sr (corresponding to a cone with angle of 120°);

2) 'white light source' means a light source having chromaticity coordinates that satisfy the following requirement:

$$-0,270 < x < 0,530$$

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

3) 'rated value' means a quantity value for a characteristic of a product for operating conditions specified in this Technical Regulation or in existing standards. Unless stated otherwise, all product parameter limits are expressed in rated values;

4) 'nominal value' means an approximate quantity value used to designate or identify a product;

5) 'light pollution' means the sum of all adverse impacts of artificial light on the environment, including the impact of obtrusive light;

6) 'obtrusive light' means the part of the light from a lighting installation that does not serve the purpose for which the installation was designed, including:

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.

7) 'Efficiency Base ballast' (EBb) means the relationship between the rated lamp power (P_{lamp}) and the ballast efficiency;

8) for ballasts for single and double capped fluorescent lamps, EBb_{FL} is calculated as follows:

when $P_{lamp} \leq 5 \text{ W}$: $EBb_{FL} = 0,71$,

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

when $P_{lamp} \geq 100 \text{ W}$: $EBb_{FL} = 0,91$;

9) 'second lamp envelope' means 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. In determining the presence of a second lamp envelope, the arc tubes of high intensity discharge lamps shall not count as a lamp envelope;

10) '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;

11) 'high-pressure mercury (vapour) lamp' means 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 kPa;

12) 'high-pressure sodium (vapour) lamp' means 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 kPa;

13) 'metal halide lamp' means 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;

14) 'electronic or high frequency ballast' means a mains supplied AC to AC inverter, including stabilising elements for starting and operating one or more tubular fluorescent lamps, generally at high frequency;

15) 'clear lamp' means a high-intensity discharge lamp with a transparent outer envelope or outer tube in which the light producing arc tube is clearly visible (e.g. clear glass lamp);

16) 'blended lamp' means a lamp containing a mercury (vapour) lamp and an incandescent lamp filament connected in series in the same bulb.

Annex 3
to the Technical Regulation

ECODESIGN REQUIREMENTS

for fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires able to operate such lamps

For each ecodesign requirement, the date of entry into force shall be established. Unless a requirement is superseded or this is otherwise specified, it shall enter into force together with the requirements becoming effective at later stages.

I. Requirements for fluorescent lamps without integrated ballast and for high intensity discharge lamps

1. Lamp efficacy requirements

1) First stage requirements

One year after this Technical Regulation has come into force the following requirements shall apply:

The minimum rated luminous efficacy of double capped fluorescent lamps of 16 mm and 26 mm diameter (T5 and T8 lamps) at 25 °C shall comply with the value specified in Table 1.

Spiral-shaped double capped fluorescent lamps of diameters equal to or larger than 16 mm (T5) shall comply with the requirements set out for T9 circular lamps in Table 5.

Table 1

Rated minimum efficacy values for T8 and T5 lamps

T8 (26 mm Ø)		T5 (16 mm Ø) high efficiency		T5 (16 mm Ø) high output	
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
15	63	14	86	24	73
18	75	21	90	39	79
25	76	28	93	49	88
30	80	35	94	54	82
36	93	-	-	80	77
38	87	-	-	-	-
58	90	-	-	-	-
70	89	-	-	-	-

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

in case the nominal wattages or lamp shapes are different from those listed in tables 2 to 5, lamps must reach the luminous efficacy of the nearest equivalent in terms of wattage and shape;

if the nominal wattage is at equal distance from two wattages in tables 2 to 5, it shall conform to the higher efficacy of the two;

if the nominal wattage is higher than the highest wattage in tables 2 to 5, it shall conform to the efficacy of that highest wattage.

Table 2

Rated minimum efficacy values for single capped fluorescent lamps working on electromagnetic and electronic ballast

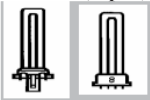
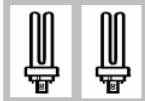
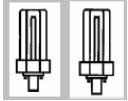

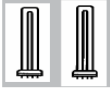



Small single parallel tube, lamp cap G23 (2 pin) or 2G7 (4 pin)		Double parallel tubes, lamp cap G24d (2 pin) or G24q (4 pin)		Triple parallel tubes, lamp cap GX24d (2 pin) or GX24q (4 pin)	
					
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
5	48	10	60	13	62
7	57	13	69	18	67
9	67	18	67	26	66
11	76	26	66		
4 legs in one plane, lamp cap 2G10 (4 pin)		Long single parallel tube, lamp cap 2G11 (4 pin)			
					
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value		
18	61	18	67		
24	71	24	75		
36	78	34	82		
		36	81		

Table 3

Rated minimum efficacy values for single capped fluorescent lamps, working only on electronic ballast

Triple parallel tubes, lamp cap GX24q (4 pin)		Four parallel tubes, lamp cap GX24q (4 pin)		Long single parallel tube, lamp cap 2G11 (4 pin)	
					
Nominal wattage (W)	Rated luminous	Nominal wattage (W)	Rated luminous efficacy	Nominal wattage (W)	Rated luminous efficacy (lm/W),

	efficacy (lm/W), 100 h initial value		(lm/W), 100 h initial value		100 h initial value
32	75	57	75	40	83
42	74	70	74	55	82
57	75			80	75
70	74				

Table 4

Rated minimum efficacy values for single capped fluorescent lamps with square shape or very high output lamps





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 5

Rated minimum efficacy values for T9 and T5 Circular lamps

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 the value referred to in tables 2 to 5 in the cases specified in Table 6:

Table 6

Deduction percentages for rated minimum efficacy values for fluorescent lamps with high colour temperature and/or high colour rendering and/or second lamp envelope and/or long life

Lamp parameter	Deduction from luminous efficacy at 25 °C
$T_c \geq 5\,000\text{ K}$	-10 %
$95 \geq Ra > 90$	-20 %
$Ra > 95$	-30 %
Second lamp envelope	-10 %
Lamp Survival Factor $\geq 0,50$ after 40 000 burning hours	-5 %

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.

2) Second stage requirements

Three years after this Technical Regulation has come into force, the following efficacy requirements shall apply to fluorescent lamps without integrated ballast and high-intensity discharge lamps.

for double capped fluorescent lamps.

The requirements applicable to double capped fluorescent lamps 26 mm in diameter (T8) during the first stage shall apply to all double capped fluorescent lamps with diameters that were not covered in the first stage.

These lamps must conform to the minimum efficacy of the T8 lamp which is their nearest equivalent with regards to wattage. If the nominal wattage is higher than the highest wattage indicated in Table 1, it shall conform to the efficacy of lamps with the highest wattage as indicated in Table 1.

The corrections (Table 6) and the specific requirements for double capped fluorescent lamps defined for the first stage shall continue to apply.

high-intensity discharge lamps

Lamps with $T_c \geq 5000\text{K}$ or equipped with a second lamp envelope shall fulfil at least 90 % of the applicable lamp efficacy requirements indicated in tables 7, 8 and 9.

High Pressure Sodium lamps with $Ra \leq 60$ shall have at least the rated luminous efficacies as indicated in Table 7:

Table 7

Rated minimum efficacy values for high pressure sodium lamps with $Ra \leq 60$

Nominal wattage (W)	Rated luminous efficacy (lm/W) — clear lamps	Rated luminous efficacy (lm/W) — not clear lamps
$W \leq 45$	≥ 60	≥ 60
$45 < W \leq 55$	≥ 80	≥ 70
$55 < W \leq 75$	≥ 90	≥ 80
$75 < W \leq 105$	≥ 100	≥ 95
$105 < W \leq 155$	≥ 110	≥ 105
$155 < W \leq 255$	≥ 125	≥ 115
$255 < W \leq 605$	≥ 135	≥ 130

The requirements indicated in Table 7 shall apply to retrofit high pressure sodium lamps designed to operate on high pressure mercury (vapour) lamp control gear and shall be effective for only six years after the entry into force of this Technical Regulation.

Metal halide lamps with $R_a \leq 80$ and high pressure sodium lamps with $R_a > 60$ shall have at least the rated luminous efficacies as indicated in Table 8:

Table 8

Rated minimum efficacy values for Metal Halide Lamps with $R_a \leq 80$ and for high pressure sodium lamps with $R_a > 60$

Nominal wattage (W)	Rated luminous efficacy (lm/W) — clear lamps	Rated luminous efficacy (lm/W) — not clear lamps
$W \leq 55$	≥ 60	≥ 60
$55 < W \leq 75$	≥ 75	≥ 70
$75 < W \leq 105$	≥ 80	≥ 75
$105 < W \leq 155$	≥ 80	≥ 75
$155 < W \leq 255$	≥ 80	≥ 75
$255 < W \leq 405$	≥ 85	≥ 75

Six years after this Technical Regulation has come into force, the rated luminous efficacy of other high intensity discharge lamps shall, at least, comply with the values indicated in Table 9:

Table 9

Rated minimum efficacy values for other high intensity discharge lamps

Nominal wattage (W)	Rated luminous efficacy (lm/W)
$W \leq 40$	50
$40 < W \leq 50$	55
$50 < W \leq 70$	65
$70 < W \leq 125$	70
$125 < W$	75

3) Third stage requirements

Eight years after the Technical Regulation has come into force:

Fluorescent lamps without integrated ballast shall be able to operate with ballasts of energy efficiency class A2 or more efficient ballasts in accordance with point 2 of section I of this Annex. In addition they may also operate with ballasts of less efficient classes than A2.

The rated luminous efficacy of metal halide lamps shall, at least, comply with the rated values indicated in Table 10:

Table 10

Rated minimum efficacy values for metal halide lamps (third stage)

Nominal wattage (W)	Rated luminous efficacy (lm/W) — clear lamps	Rated luminous efficacy (lm/W) — not clear lamps
$W \leq 55$	≥ 70	≥ 65
$55 < W \leq 75$	≥ 80	≥ 75
$75 < W \leq 105$	≥ 85	≥ 80

$105 < W \leq 155$	≥ 85	≥ 80
$155 < W \leq 255$	≥ 85	≥ 80
$255 < W \leq 405$	≥ 90	≥ 85

Lamps equipped with T_c $T_c \geq 5\,000\text{ K}$ or with a second lamp envelope shall fulfil at least 90 % of the applicable lamp efficacy requirements.

2. Lamp performance requirements

1) First stage requirements

One year after this Technical Regulation has come into force the following requirements shall apply:

Fluorescent lamps without integrated ballast covered by the requirements of subpoint 1 of point 1 of section I of this Annex shall have a colour rendering index (Ra) of at least 80.

2) Second stage requirements

Three years after this Technical Regulation has come into force the following requirements shall apply:

Fluorescent lamps without integrated ballast shall have a colour rendering index (Ra) of at least 80. The minimum lamp lumen maintenance factors shall comply with the value indicated in Table 11:

Table 11

Lamp lumen maintenance factors for single and double capped fluorescent lamps — second stage

Lamp lumen maintenance factor	Burning hours			
	2 000	4 000	8 000	16 000
Lamp types	2 000	4 000	8 000	16 000
Double-Capped Fluorescent lamps operating on non-high frequency ballasts	0,95	0,92	0,90	—
T8 Double-Capped Fluorescent lamps on high frequency ballast with warmstart	0,96	0,92	0,91	0,90
Other Double-Capped Fluorescent lamps on high frequency ballast with warmstart	0,95	0,92	0,90	0,90
Circular Single-Capped Fluorescent lamps operating on non-high frequency ballasts, T8 U-shaped double-capped fluorescent lamps and spiral-shaped double capped fluorescent lamps of all diameters equal to or larger than 16 mm (T5)	0,80	0,74	—	—
	0,72 at 5 000 burning hours			
Circular Single-Capped Fluorescent lamps operating on high frequency ballasts	0,85	0,83	0,80	—
	0,75 at 12 000 burning hours			
Other Single-Capped Fluorescent lamps operating on non-high frequency ballasts	0,85	0,78	0,75	—
Other Single-Capped Fluorescent lamps on high frequency ballast with warmstart	0,90	0,84	0,81	0,78

The cumulative deductions, that are to be applied to the values in Table 11, are set out in Table 11a.

Table 11a

Deduction percentages for fluorescent lamp lumen maintenance requirements

Lamp parameter	Deduction from lamp lumen maintenance requirement
Lamps with $95 \geq Ra > 90$	At burning hours $\leq 8\,000\text{ h}$: – 5 %
	At burning hours $> 8\,000\text{ h}$: – 10 %
Lamps with $Ra > 95$	At burning hours $\leq 4\,000\text{ h}$: – 10 %
	At burning hours $> 4\,000\text{ h}$: – 15 %

Lamps with a colour temperature $\geq 5\,000\text{ K}$	-10 %
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The minimum lamp survival factors of fluorescent lamps shall comply with the values indicated in Table 12:

Table 12

Lamp survival factors for single and double capped fluorescent lamps — second stage

Lamp survival factor	Burning hours				
	Lamp types	2 000	4 000	8 000	16 000
Double-Capped Fluorescent lamps operating on non-high frequency ballasts		0,99	0,97	0,90	—
Double-Capped Fluorescent lamps on high frequency ballast with warmstart		0,99	0,97	0,92	0,90
Circular Single-Capped Fluorescent lamps operating on non-high frequency ballasts, T8 U-shaped double-capped fluorescent lamps and spiral-shaped double capped fluorescent lamps of all diameters equal to or larger than 16 mm (T5)		0,98	0,77	—	—
		0,50 at 5 000 burning hours			
Circular Single-Capped Fluorescent lamps operating on high frequency ballasts		0,99	0,97	0,85	—
		0,50 at 12 000 burning hours			
Other Single-Capped Fluorescent lamps operating on non-high frequency ballasts		0,98	0,90	0,50	—
Other Single-Capped Fluorescent lamps on high frequency ballast with warmstart		0,99	0,98	0,88	—

The minimum lamp lumen maintenance factors and lamp survival factors for high pressure sodium lamps shall comply with the values indicated in Table 13:

Table 13

Lamp lumen maintenance factors and lamp survival factors for high pressure sodium lamps — second stage

High pressure sodium lamp category and burning hours for measurement		Lamp lumen maintenance factor	Lamp survival factor
P $\leq 75\text{ W}$ LLMF and LSF, measured at 12 000 burning hours	Ra ≤ 60	> 0,80	> 0,90
	Ra > 60	> 0,75	> 0,75
	all retrofit lamps designed to operate on high pressure mercury vapour lamp ballast	> 0,75	> 0,80
P > 75 W $\leq 605\text{ W}$ LLMF and LSF, measured at 16 000 burning hours	Ra ≤ 60	> 0,85	> 0,90
	Ra > 60	> 0,70	> 0,65
	all retrofit lamps designed to operate on high pressure mercury vapour lamp ballast	> 0,75	> 0,55

The requirements in Table 13 for retrofit lamps designed to operate on high pressure

mercury vapour lamp ballast shall be applicable until 6 years after the entry into force of this Technical Regulation.

3) *Third stage requirements*

8 years after this Technical Regulation has come into force the following requirements shall apply:

The minimum lamp lumen maintenance factors and lamp survival factors for metal halide lamps shall comply with the values indicated in Table 14:

Table 14

Lamp lumen maintenance factors and lamp survival factors for metal halide lamps — third stage

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

3. Product information requirements on lamps

1) One year after this Technical Regulation has come into force, manufacturers of fluorescent lamps without integrated ballast and high intensity discharge lamps shall provide the product information on free-access websites or in any other forms they deem appropriate. That information shall also be contained in the product technical documentation file drawn up for the purposes of conformity assessment.

2) The list of information to be provided:

nominal and rated lamp wattage;

nominal and rated lamp luminous flux;

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

rated lamp Lumen Maintenance Factor at 2 000 h, 4 000 h, 6 000 h, 8 000 h, 12 000 h, 16 000 h and 20 000 h (up to 8 000 h only for new lamps on the market where no data is yet available). If a product can operate both at 50 Hz and at High Frequency, the lamp Lumen Maintenance Factor shall be indicated together with the operation mode of the lamp that was used for the test.

rated lamp Survival Factor at 2 000 h, 4 000 h, 6 000 h, 8 000 h, 12 000 h, 16 000 h and 20 000 h (up to 8 000 h only for new lamps on the market where no data is yet available). If a product can operate both at 50 Hz and at High Frequency, the lamp Survival Factor shall be indicated together with the operation mode of the lamp that was used for the test.

lamp mercury content indicated as X.X mg;

colour Rendering Index (Ra) of the lamp;

colour temperature of the lamp;

ambient temperature inside the luminaire at which the lamp was designed to maximise its luminous flux. If this temperature is lower than 0 °C or equal to or higher than 50 °C, it shall be stated that the lamp is not suitable for indoor use at standard room temperatures.

for fluorescent lamps without integrated ballast, the energy efficiency indexes of ballasts with which the lamp can operate shall be indicated in accordance with Table 17.

II. Requirements on ballasts for fluorescent lamps without integrated ballast and ballasts for high intensity discharge lamps

1. Ballast energy performance requirements

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

1) First stage requirements

One year after this Technical Regulation has come into force:

The minimum energy efficiency index of ballasts covered by Table 17 of subpoint 1 of point 2 of section II of this Annex shall comply with B2 class; for ballasts covered by Table 18 — the A3 class; for dimmable ballasts covered by Table 19 — A1 class. At the dimming position corresponding to 25 % of the lumen output of the operated lamp, the input power (P_{in}) 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.

The power consumption of the fluorescent lamp ballasts shall not exceed 1,0 W when operated lamps do not emit any light in normal operating conditions and when other possible connected components (network connections, sensors etc.) are disconnected. If lamps and the connected components cannot be switched off, their power shall be measured separately and deducted from the result.

2) Second stage requirements

Three years after the implementing measures come into force, ballasts for high intensity discharge lamps shall have the efficiency specified in Table 15.

Table 15

Minimum efficiency for ballasts for high intensity discharge lamps — second stage

Nominal lamp wattage (P) W	Minimum ballast efficiency ($\eta_{ballast}$) %
$P \leq 30$	65
$30 < P \leq 75$	75
$75 < P \leq 105$	80

105 < P ≤ 405	85
P > 405	90

The power consumption of ballasts able to operate fluorescent lamps without integrated ballast shall not exceed 0,5 W when operated lamps do not emit any light in normal operating conditions. This requirement shall apply to ballasts when other possible connected components (network connections, sensors etc.) are disconnected. If they cannot be switched off, their power shall be measured and deducted from the result.

3) Third stage requirements

Eight years after the Technical Regulation has come into force, ballasts able to operate fluorescent lamps without integrated ballast shall have the efficiency:

$$\eta_{ballast} \geq E B b_{FL};$$

the value of $E B b_{FL}$ is specified in point 3 of Annex 2.

Ballasts able to operate high intensity discharge lamps shall have the efficiency described in Table 16.

Table 16

Minimum efficiency for ballasts for high intensity discharge lamps — third stage

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

2. Product information requirements on ballasts

Manufacturers of ballasts shall provide the information with regard to ballasts on free-access websites and in other forms they deem appropriate. That information shall be affixed in a suitable and accessible form to the product and contained in the technical documentation file drawn up for the purposes of conformity assessment.

1) First stage requirements

One year after this Technical Regulation has come into force, for ballasts able to operate fluorescent lamps, the energy efficiency index (EEI) class shall be determined as defined below.

Energy efficiency index (EEI) forms a classification system of ballasts for fluorescent lamps without integrated ballasts in classes according to efficiency limit values. Non-dimmable ballasts shall be classified (in descending order of efficiency) into A2 BAT, A2, A3, B1, B2 classes, and dimmable ballasts — into A1 BAT and A1 classes.

Table 17 contains 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 17

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

LAMP DATA					BALLAST EFFICIENCY (P lamp/P input)				
					Non-dimmable				
Lamp type	Nominal wattage	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2
			50 Hz	HF					
	W		W	W					
T8	15	FD-15-E-G13-26/450	15	13,5	87,8 %	84,4 %	75,0 %	67,9 %	62,0 %
T8	18	FD-18-E-G13-26/600	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
T8	30	FD-30-E-G13-26/900	30	24	82,1 %	77,4 %	72,7 %	79,2 %	75,0 %
T8	36	FD-36-E-G13-26/1200	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
T8	38	FD-38-E-G13-26/1050	38,5	32	87,7 %	84,2 %	80,0 %	84,1 %	80,4 %
T8	58	FD-58-E-G13-26/1500	58	50	93,0 %	90,9 %	84,7 %	86,1 %	82,2 %
T8	70	FD-70-E-G13-26/1800	69,5	60	90,9 %	88,2 %	83,3 %	86,3 %	83,1 %
TC-L	18	FSD-18-E-2G11	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
TC-L	24	FSD-24-E-2G11	24	22	90,7 %	88,0 %	81,5 %	76,0 %	71,3 %
TC-L	36	FSD-36-E-2G11	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
TCF	18	FSS-18-E-2G10	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
TCF	24	FSS-24-E-2G10	24	22	90,7 %	88,0 %	81,5 %	76,0 %	71,3 %
TCF	36	FSS-36-E-2G10	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
TC-D / DE	10	FSQ-10-E-G24q=1 FSQ-10-I-G24d=1	10	9,5	89,4 %	86,4 %	73,1 %	67,9 %	59,4 %
TC-D / DE	13	FSQ-13-E-G24q=1 FSQ-13-I-G24d=1	13	12,5	91,7 %	89,3 %	78,1 %	72,6 %	65,0 %
TC-D / DE	18	FSQ-18-E-G24q=2 FSQ-18-I-G24d=2	18	16,5	89,8 %	86,8 %	78,6 %	71,3 %	65,8 %
TC-D / DE	26	FSQ-26-E-G24q=3 FSQ-26-I-G24d=3	26	24	91,4 %	88,9 %	82,8 %	77,2 %	72,6 %
TC-T / TE	13	FSM-13-E-GX24q=1 FSM-13-I-GX24d=1	13	12,5	91,7 %	89,3 %	78,1 %	72,6 %	65,0 %
TC-T / TE	18	FSM-18-E-GX24q=2 FSM-18-I-GX24d=2	18	16,5	89,8 %	86,8 %	78,6 %	71,3 %	65,8 %
TC-T / TC-TE	26	FSM-26-E-GX24q=3 FSM-26-I-GX24d=3	26,5	24	91,4 %	88,9 %	82,8 %	77,5 %	73,0 %
TC-DD / DDE	10	FSS-10-E-GR10q FSS-10-L/P/H-GR10q	10,5	9,5	86,4 %	82,6 %	70,4 %	68,8 %	60,5 %
TC-DD / DDE	16	FSS-16-E-GR10q FSS-16-I-GR8	16	15	87,0 %	83,3 %	75,0 %	72,4 %	66,1 %

		FSS-16-L/P/H-GR10q								
TC-DD / DDE	21	FSS-21-E-GR10q FSS-21-L/P/H-GR10q	21	19,5	89,7 %	86,7 %	78,0 %	73,9 %	68,8 %	
TC-DD / DDE	28	FSS-28-E-GR10q FSS-28-I-GR8 FSS-28-L/P/H-GR10q	28	24,5	89,1 %	86,0 %	80,3 %	78,2 %	73,9 %	
TC-DD / DDE	38	FSS-38-E-GR10q FSS-38-L/P/H-GR10q	38,5	34,5	92,0 %	89,6 %	85,2 %	84,1 %	80,4 %	
TC	5	FSD-5-I- G23 FSD-5-E-2G7	5,4	5	72,7 %	66,7 %	58,8 %	49,3 %	41,4 %	
TC	7	FSD-7-I-G23 FSD-7-E-2G7	7,1	6,5	77,6 %	72,2 %	65,0 %	55,7 %	47,8 %	
TC	9	FSD-9-I-G23 FSD-9-E-2G7	8,7	8	78,0 %	72,7 %	66,7 %	60,3 %	52,6 %	
TC	11	FSD-11-I-G23 FSD-11-E-2G7	11,8	11	83,0 %	78,6 %	73,3 %	66,7 %	59,6 %	
T5	4	FD-4-E-G5-16/150	4,5	3,6	64,9 %	58,1 %	50,0 %	45,0 %	37,2 %	
T5	6	FD-6-E-G5-16/225	6	5,4	71,3 %	65,1 %	58,1 %	51,8 %	43,8 %	
T5	8	FD-8-E-G5-16/300	7,1	7,5	69,9 %	63,6 %	58,6 %	48,9 %	42,7 %	
T5	13	FD-13-E-G5-16/525	13	12,8	84,2 %	80,0 %	75,3 %	72,6 %	65,0 %	
T9-C	22	FSC-22-E-G10q-29/200	22	19	89,4 %	86,4 %	79,2 %	74,6 %	69,7 %	
T9-C	32	FSC-32-E-G10q-29/300	32	30	88,9 %	85,7 %	81,1 %	80,0 %	76,0 %	
T9-C	40	FSC-40-E-G10q-29/400	40	32	89,5 %	86,5 %	82,1 %	82,6 %	79,2 %	
T2	6	FDH-6-L/P-W4,3x8,5d-7/220		5	72,7 %	66,7 %	58,8 %			
T2	8	FDH-8-L/P-W4,3x8,5d-7/320		7,8	76,5 %	70,9 %	65,0 %			
T2	11	FDH-11-L/P-W4,3x8,5d-7/420		10,8	81,8 %	77,1 %	72,0 %			
T2	13	FDH-13-L/P-W4,3x8,5d-7/520		13,3	84,7 %	80,6 %	76,0 %			
T2	21	FDH-21-L/P-W4,3x8,5d-7/		21	88,9 %	85,7 %	79,2 %			
T2	23	FDH-23-L/P-W4,3x8,5d-7/		23	89,8 %	86,8 %	80,7 %			
T5-E	14	FDH-14-G5-L/P-16/550		13,7	84,7 %	80,6 %	72,1 %			
T5-E	21	FDH-21-G5-L/P-16/850		20,7	89,3 %	86,3 %	79,6 %			
T5-E	24	FDH-24-G5-L/P-16/550		22,5	89,6 %	86,5 %	80,4 %			
T5-E	28	FDH-28-G5-L/P-16/1150		27,8	89,8 %	86,9 %	81,8 %			
T5-E	35	FDH-35-G5-L/P-16/1450		34,7	91,5 %	89,0 %	82,6 %			
T5-E	39	FDH-39-G5-L/P-16/850		38	91,0 %	88,4 %	82,6 %			
T5-E	49	FDH-49-G5-L/P-16/1450		49,3	91,6 %	89,2 %	84,6 %			
T5-E	54	FDH-54-G5-L/P-16/1150		53,8	92,0 %	89,7 %	85,4 %			
T5-E	80	FDH-80-G5-L/P-16/1150		80	93,0 %	90,9 %	87,0 %			
T5-E	95	FDH-95-G5-L/P-16/1150		95	92,7 %	90,5 %	84,1 %			

T5-E	120	FDH-120-G5-L/P-16/1450		120	92,5 %	90,2 %	84,5 %		
T5-C	22	FSCH-22-L/P-2GX13-16/225		22,3	88,1 %	84,8 %	78,8 %		
T5-C	40	FSCH-40-L/P-2GX13-16/300		39,9	91,4 %	88,9 %	83,3 %		
T5-C	55	FSCH-55-L/P-2GX13-16/300		55	92,4 %	90,2 %	84,6 %		
T5-C	60	FSCH-60-L/P-2GX13-16/375		60	93,0 %	90,9 %	85,7 %		
TC-LE	40	FSDH-40-L/P-2G11		40	91,4 %	88,9 %	83,3 %		
TC-LE	55	FSDH-55-L/P-2G11		55	92,4 %	90,2 %	84,6 %		
TC-LE	80	FSDH-80-L/P-2G11		80	93,0 %	90,9 %	87,0 %		
TC-TE	32	FSMH-32-L/P-2GX24q=3		32	91,4 %	88,9 %	82,1 %		
TC-TE	42	FSMH-42-L/P-2GX24q=4		43	93,5 %	91,5 %	86,0 %		
TC-TE	57	FSM6H-57-L/P-2GX24q=5 FSM8H-57-L/P-2GX24q=5		56	91,4 %	88,9 %	83,6 %		
TC-TE	70	FSM6H-70-L/P-2GX24q=6 FSM8H-70-L/P-2GX24q=6		70	93,0 %	90,9 %	85,4 %		
TC-TE	60	FSM6H-60-L/P-2G8=1		63	92,3 %	90,0 %	84,0 %		
TC-TE	62	FSM8H-62-L/P-2G8=2		62	92,2 %	89,9 %	83,8 %		
TC-TE	82	FSM8H-82-L/P-2G8=2		82	92,4 %	90,1 %	83,7 %		
TC-TE	85	FSM6H-85-L/P-2G8=1		87	92,8 %	90,6 %	84,5 %		
TC-TE	120	FSM6H-120-L/P-2G8=1 FSM8H-120-L/P-2G8=1		122	92,6 %	90,4 %	84,7 %		
TC-DD	55	FSSH-55-L/P-GRY10q3		55	92,4 %	90,2 %	84,6 %		

In addition, non-dimmable ballasts not included in Table 17 shall be assigned an EEI depending on their efficiency as described in Table 18:

Table 18

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

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

The definition of Ebb_{FL} is set out in point 3 of Annex 2.

Furthermore, dimmable fluorescent lamp ballasts receive the EEI class according to the class into which the ballast would fall when it is operated at the 100 % lumen output, as described in Table 19.

Table 19

Energy efficiency index requirements for dimmable ballasts for fluorescent lamps

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

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

2) *Second stage requirements*

Three years after this Technical Regulation has come into force, for ballasts for high intensity discharge lamps, the efficiency of the ballast shall be determined according to point 1 of Annex 2.

III. Requirements for luminaires designed to operate fluorescent lamps without integrated ballast and for luminaires for high intensity discharge lamps

1. Luminaire energy performance requirements

1) *First stage requirements*

One year after this Technical Regulation has come into force, the power consumption of luminaires for fluorescent lamps without integrated ballast shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are normally operating do not emit any light when other possible connected components (network connections, sensors etc.) are disconnected. If they cannot be switched off, their power shall be measured and deducted from the result.

2) *Second stage requirements*

Three years after this Technical Regulation has come into force, luminaires for fluorescent lamps without integrated ballast and for high intensity discharge lamps shall be equipped with ballasts complying with the third stage requirements, except luminaires with ingress protection grade at least IP4X. The power consumption of luminaires for high intensity discharge lamps shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are normally operating do not emit any light when other possible connected components (network connections, sensors etc.) are disconnected. If they cannot be switched off, their power shall be measured and deducted from the result.

3) *Third stage requirements*

Eight years after the Technical Regulation has come into force, all luminaires intended to operate fluorescent lamps without integrated ballast and for high intensity discharge lamps shall be compatible with ballasts complying with the third stage requirements.

2. Product information requirements on luminaires

1) *First stage requirements*

18 months after this Technical Regulation has come into force, manufacturers of luminaires for fluorescent lamps without integrated ballast with total lamp lumen above 2 000 lm shall provide the following information on free-access websites and in any other forms they deem appropriate. That information shall also be contained in the technical documentation file drawn up for the purposes of conformity assessment.

The list of required information:

if the luminaire is placed on the market together with the ballast, information on the efficiency of the ballast shall be provided according to point 2 of section II of this

Annex, in accordance with the ballast manufacturer's data;
if the luminaire is placed on the market together with the lamp, lamp efficacy (lm/W) of the lamp shall be provided, in accordance with the lamp manufacturer's data;
if the ballast or the lamp are not placed on the market 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);
maintenance instructions shall be provided to ensure that the luminaire maintains, as far as possible, its original quality throughout its lifetime;
disassembly instructions shall be provided

2) *Second stage requirements*

Three years after this Technical Regulation has come into force, the information provision requirements of the first stage shall also apply to luminaires for high intensity discharge lamps with total lamp lumen above 2 000 lm. In addition, all luminaires for high intensity discharge lamps shall indicate that they are designed for either clear and/or coated lamps within the meaning of Annex 2.

Verification procedure for market surveillance purposes

When the state market surveillance authorities verify the compliance of fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires able to operate such lamps with the requirements of Annex 3 to this Technical Regulation, they shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art measurement methods.

1. Verification procedure for lamps

The state market surveillance authorities shall test a sample batch of minimum 20 lamps of the same model from the same manufacturer, randomly selected.

The batch shall be considered to comply with the requirements set out in section I of Annex 3 to this Technical 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 with the requirements of the Technical Regulation.

2. Verification procedure for ballasts and luminaires

The state market surveillance authorities shall test one single unit.

The model shall be considered to comply with the requirements set out in sections II and III of Annex 3 to this Technical Regulation, if the results do not exceed the limit values.

If the result exceeds the limit values, three more units shall be tested. The model shall be considered to comply with this Technical Regulation if the average of the results does not exceed the limit values.

Otherwise, the model shall be considered not to comply with the requirements of this Technical Regulation.

Annex 5
to the Technical Regulation

Indicative benchmarks for fluorescent lamps and high intensity discharge lamps

The best available technologies on the market for fluorescent lamps and high intensity discharge lamps, at the time of entry into force by this Technical Regulation, are the following:

1. Lamp efficacy and lamp life

For single and double capped fluorescent lamps, the benchmark values are the best values set out in points 1 to 2 of section I of Annex 3.

For high-intensity discharge lamps:

The benchmark values for metal halide lamps (clear and frosted) are set out in Table 20.

Table 20

Benchmark values for rated efficacy and performance for metal halide lamps (benchmark level)

	Ra ≥ 80	80 > Ra ≥ 60
Nominal lamp wattage [W]	Rated Lamp Efficacy [lm/W]	Rated Lamp Efficacy [lm/W]
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	
Burning hours	Lamp Lumen Maintenance Factor	Lamp survival factor
12 000	> 0,80	> 0,80

The benchmark values for high-pressure sodium lamps (clear and frosted) are set out in Table 21.

Table 21

Benchmark values for rated efficacy and performance for high-pressure sodium lamps

Nominal lamp wattage [W]	Rated Lamp Efficacy [lm/W]
W ≤ 55	≥ 88
55 < W ≤ 75	≥ 91
75 < W ≤ 105	≥ 107
105 < W ≤ 155	≥ 110

$155 < W \leq 255$	≥ 128
$255 < W \leq 405$	≥ 138

Burning hours	Lamp Lumen Maintenance Factor	Lamp survival factor
16 000	$> 0,94$	$> 0,92$

2. Lamp mercury content

The energy efficient fluorescent lamps with the lowest mercury content include not more than 1,4 mg mercury and the energy efficient high-intensity discharge lamps with the lowest mercury content include not more than 12 mg of mercury.

3. Ballast performance

For applications where dimming is beneficial, the following benchmarks values apply:

fluorescent lamp ballasts with energy efficiency index A1 BAT that are continuously dimmable down to 10 % light output.

ballasts for dimmable high intensity discharge lamps which can be dimmed down to 40 % light output having ballast efficiency of 0,9 (best known result, actual dimming possibilities may depend on the high-intensity discharge lamp type used with the ballast).

4. Product information on luminaires

In addition to the provisions of point 2 of section III of Annex 3, manufacturers must provide the information on CEN flux code of the luminaire or the complete photometric file for benchmark luminaires on free-access websites or in other forms the manufacturers deem appropriate.

Indicative benchmarks for products meant to be installed as office lighting

The best available technologies on the market for the products meant to be installed as office lighting, at the time of entry into force by this Technical Regulation, are the following:

1. Lamp benchmarks

1) Lamp performance

The benchmarks for lamps efficacy shall comply with the values specified in Annex 5.

The lamp lumen maintenance factor (LLMF) and lamp survival factor (LSF) for lamps meant to be installed as office lighting shall comply with the values indicated in Table 22:

Table 22

Benchmark values for LLMF and LSF for office lighting lamps

Burning hours	2 000	4 000	8 000	16 000
LLMF	0,97	0,93	0,90	0,90
LSF	0,99	0,99	0,98	0,93

In addition, these lamps may be dimmable to 10 % or less of their light output.

2) Product information for lamps

Manufacturers shall provide the information referred to in point 3 of section I of Annex 3 on free-access websites and in any other forms they deem appropriate.

2. Benchmarks for light source control gear

1) Light source control gear performance

Fluorescent lamp ballasts have an energy efficiency index of at least A1 (BAT) according to point 2 of section II of Annex 3 and are dimmable.

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

Any other types of light source control gear have an efficiency of 88 % (≤ 100 W input power) or 90 % when measured according to the national standards, harmonized with the relevant international and European standards, and documents adopted by international and regional metrology organizations, and are dimmable for lamps above total input power 55 W.

2) Product information for light source control gear

Manufacturers shall provide the information on the efficiency of the ballast or the applicable type of light source control gear on free-access websites and in any

other forms they deem appropriate.

3. Benchmarks for luminaires

1) Luminaires performance

Luminaires have a luminaire maintenance factor $LMF > 0,95$ in normal office pollution degrees with a cleaning cycle of 1 time every 4 years.

If luminaires are designed to operate fluorescent or high intensity discharge lamps, they shall be compatible with at least one lamp type complying with the benchmarks indicated in Annex 5.

In addition, the luminaires shall be 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.

2) Product information on luminaires

Manufacturers shall provide the information in accordance with point 2 of section III of Annex 3 and Annex 5 on free-access websites and in any other forms they deem appropriate.

In addition, for all luminaires, excluding luminaires with bare lamps and no optics, applicable luminaire maintenance factor (LMF) value data is provided. If cleaning of the luminaire is needed before to 4 years of service, the cleaning instructions are provided in the form of Table 23:

Table 23

Indicative benchmarks for luminaire maintenance factor

LMF values							
Environmental conditions	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 is 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 is provided, e.g. $LLMF \times LMF$ instead of simply the LMF.

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

The best available technologies on the market for the products meant to be installed as public street lighting, at the time of entry into force by this Technical Regulation, are the following:

2. Lamp benchmarks

1) Lamp performance

The benchmarks for lamps efficacy comply with the values specified in Annex 5.

The lamp lumen maintenance factor (LLMF) and lamp survival factor (LSF) for lamps comply with the values indicated in Table 24:

Table 24

Benchmark values for LLMF and LSF for public street lighting lamps

Burning hours	2 000	4 000	8 000	16 000
LLMF	0,98	0,97	0,95	0,92
LSF	0,99	0,98	0,95	0,92

In addition, these lamps may be dimmable to at least 50 % of their light output when the rated lamp lumen output is above 9 000 lm.

2) Product information for lamps

Manufacturers shall provide, at least, the information referred to in point 1.3 of Annex 3 on free-access websites and in any other forms they deem appropriate.

2. Benchmarks for light source control gear

1) Light source control gear performance

Fluorescent lamp ballasts have an energy efficiency index of at least A1 (BAT) according to point 2 of section II of Annex 3 and are dimmable.

High intensity discharge lamp ballasts have an efficiency of above 87 % (≤ 100 W lamp power) or above 89 % measured according to Annex 2 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 W input power) or above 89 % when measured according to the national standards, harmonized with the relevant international and European standards, and documents adopted by international and regional metrology organizations, and are dimmable for lamps equal or above total input power 55 W.

2) Product information for light source control gear

Manufacturers shall provide the information on the efficiency of the ballast or the applicable type of light source control gear on free-access websites and in any other forms they deem appropriate.

4. Benchmarks for luminaires

1) Luminaires performance

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

IP65 for road classes ME1 to ME6 and MEW1 to MEW6;

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, according to Table 25, to:

Table 25

Indicative benchmarks for maximum Upward Light Output Ratio (ULOR) per road class for street lighting luminaires

Road classes ME1 to ME6 and MEW1 to MEW6, all lumen outputs	3%
Road classes CE0 to CE5, S1 to S6, ES, EV and A:	
— 12 000 lm ≤ light source	5%
— 8 500 lm ≤ light source < 12 000 lm	10 %
— 3 300 lm ≤ light source < 8 500 lm	15 %
— light source < 3 300 lm	20 %

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

Luminaires are 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 is not to the detriment of the overall energy efficiency of the installation for which it is designed.

If a luminaire is designed for fluorescent or high-intensity discharge lamps, it is compatible with at least one lamp type complying with the benchmarks indicated in Annex 5.

Luminaires may be used in 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.

2) Product information on luminaires

Manufacturers shall provide the following information for the relevant luminaires models on free-access websites and in any other forms they deem appropriate:

the information in accordance with point 2 of section III of Annex 3 and Annex 5, as applicable;

Utilisation Factor values for standard road conditions in tabular form for the

defined road class. The table contains 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;

installation instructions for optimising the Utilisation Factor;

additional installation recommendations to minimise obtrusive light (if not conflicting with UF optimisation and safety);

for all luminaires, excluding luminaires with bare lamps and no optics, applicable luminaire maintenance factor (LMF) value data is provided in the form of Table 26:

Table 26

Indicative luminaire maintenance factor values

Pollution category	LMF value						
	Period of operation (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 is provided, e.g. $LLMF \times LMF$ instead of simply the LMF.

Annex 8
to the Technical Regulation

CORRELATION TABLE
of the provisions of the 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

Provisions of the Commission Regulation (EC)	Provisions of the Technical Regulation
Article 1	point 1
Article 2	point 2
Article 2(1)	fourth indent of point 2
Article 2(2)	ninth indent of point 2
Article 2(3)	third indent of point 2
Article 2(4)	fifth indent of point 2
Article 2(5)	second indent of point 2
Article 2(6)	tenth indent of point 2
Article 2(7)	seventh indent of point 2
Article 2(8)	eighth indent of point 2
Article 2(9)	sixth indent of point 2
Article 3	point 3
Article 4	point 4
Article 5	point 5
Article 6	point 6
Article 7	-
Article 8	-
Article 9	-
Annex I	Annex 1
Annex II	Annex 2
Annex III	Annex 3
Annex IV	Annex 4
Annex V	Annex 5
Annex VI	Annex 6
Annex VII	Annex 7