WORKING DOCUMENT
ON A POSSIBLE COMMISSION REGULATION IMPLEMENTING DIRECTIVE 2005/32/EC WITH REGARD TO NON-DIRECTIONAL HOUSEHOLD LAMPS

Chapter 1
Subject matter and scope

This Regulation establishes ecodesign requirements for the placing on the market of non-directional household lamps, also when they are marketed for non-household use or when they are integrated into other energy-using products.

The products listed in Annex I shall be exempt from the requirements set out in 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) "lamp" or “light source” means a source made in order to produce an optical radiation, usually visible, including any additional components necessary for starting, power supply or stable operation of the lamp or for the distribution, filtering or transformation of the optical radiation, in case those components cannot be removed without permanently damaging the unit;

(2) "household lamp" means any lamp except those listed in Annex I;

(3) "directional lamp" means a lamp having at least 80% light output within a solid angle of π sr (corresponding to a cone with angle of 120°);

(4) "filament lamp" means a lamp in which light is produced by means of a threadlike conductor which is heated to incandescence by the passage of an electric current. The lamp may or may not contain gases influencing the process of incandescence;

(5) "incandescent lamp" means a filament lamp in which the filament operates in an evacuated bulb or is surrounded by inert gas;

(6) "tungsten halogen lamp" means a filament lamp in which the filament is made of tungsten and is surrounded by gas containing halogens or halogen compounds;

(7) "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;

(8) "fluorescent lamp” means a discharge lamp 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;

(9) "ballast" means a device which serves 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. It 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);

(10) “power supply” means a device which is designed to convert alternating current (AC) power input from the mains power source input into lower voltage direct current (DC) or AC output;

(10) “compact fluorescent lamp" means a unit which cannot be dismantled without being permanently damaged, provided with a lamp cap and incorporating a fluorescent lamp and any additional components necessary for starting and stable operation of the lamp;

(11) “fluorescent lamps without integrated ballast" means single and double capped fluorescent lamps without integrated ballast;

(12) “high intensity discharge lamps” means electric discharge lamps in which the light producing arc is stabilized by wall temperature and the arc has a bulb wall loading in excess of 3 watts per square centimetre;

(13) “light emitting diode” or “LED” means a solid state device embodying a p-n junction, emitting optical radiation when excited by an electric current;

(14) "lamp cap" means that part of a lamp which provides connection to the electrical supply by means of a socket or lamp connector and, in most cases, also serves to retain the lamp in the socket;

(15) "socket" means a device which holds the lamp in position, usually by having the cap inserted in it, in which case it also provides the means of connecting the lamp to the electric supply.

For the purposes of Annexes I and III to V, the definitions set out in Annex II shall also apply.

Chapter 3
Ecodesign requirements

1. Non-directional household lamps shall meet the ecodesign requirements set out in Annex III.

2. Each ecodesign requirement shall applying accordance with the following stages:

Stage 1: 1st October 2009

Stage 2: 1st October 2011

Stage 3: 1st October 2013

Unless a requirement is superseded or this is otherwise specified, it shall continue to apply together with the other requirements introduced at later stages.

Chapter 4
Conformity assessment

The conformity assessment procedure 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 a copy of the product information provided in accordance with Annex III part 3.

Chapter 5

Verification procedure for market surveillance purposes

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

Chapter 6

Indicative benchmarks

The indicative benchmarks for best-performing products and technology available on the market at the time of adopting this Regulation are identified in Annex V.

Chapter 7

Revision

The Commission shall review this Regulation in light of technological progress no later than 5 years after the entry into force .

Chapter 8

Entry into force

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

Chapter 9

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

STRUCTURE OF THE ANNEXES

ANNEX I
General exemptions

The following lamps shall be exempted from the provisions of this Regulation:

a) lamps that are not white light sources as defined in Annex II;

b) lamps that are directional light sources;

c) tungsten halogen lamps having a luminous flux above 10000 lumens;

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

e) fluorescent lamps without integrated ballast;

f) high-intensity discharge lamps;

g) lamps having one of the following caps, with a voltage equal to or below 60 volts:

BA15s, BA15d, BA20d, BA20s, P15d-25-3, P20d, P22d, P26s, P29t, P43t, P43t-38, P45t, PG13, PGJ13, PGJ19-1, PGJ19-2, PGJ19-5, PGJY19-1, PGJY19-2, PGJY19-5, PK22s, PKY22s, PKZ22s, PU43t, PX26d, PX29t, PX43t, PY20d, PZ20d, X511, P15d-25-1, P15d-30, PGJ23t-1, P14.5s, PX14.5s, P26.4t, BA7, BA9s, BAU15s, BAW15d, BAW15s, BAX9s, BAY15d, BAY9s, BAZ15d, E10, EP10, SV7-8, W3x16d, W3x16q, WX3x16d, SX6s, W2x4.6d, WY2x4.6d, W2.1x9.2d, W2.1x9.5d, WX2.1x9.5d, B8.5d, BX8.5d, B8.3d, BG8-5.5d, BG8.5d-5.5, BG8.5s/40, BX8.4d-12.5, S5.7s,

P13.5s, SV8.5-8, S9.15-VAR1, W2.5x16q, W2.5x16d, PX13.5s, S8.5/8.5, B10d-14.5, BX10d-14.5, EBS R11, B8.4d-12.5, P26.4t, PGJ19-4, PGJY19-3, PGJY19-4, PGJ23t-1

h) lamps able to operate at external temperature of 300 °C or more, in case the intended application is other than room illumination and the intended application is clearly and prominently stated on the packaging and in all forms of product documentation.

ANNEX II
Technical parameters covered and definitions for the purposes of Annexes I and III to VII

1. TECHNICAL PARAMETERS FOR ECODESIGN REQUIREMENTS

For the purposes of compliance and verification of compliance with the requirements of this Regulation, the parameters below shall be established by reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art measurement methods.

a) "Luminous efficacy of a source", "light source efficacy" or "lamp efficacy" (η_{lamp}), which is the quotient of the luminous flux emitted (Φ) by the power consumed by the source (P_{lamp}): $\eta_{lamp} = \Phi / P_{lamp}$(unit: lm/W). The power dissipated by non-integrated auxiliary equipment such as ballasts or transformers is not included in the power consumed by the source;

b) “Lamp Lumen Maintenance Factor” (LLMF), which is 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), which is the fraction of the total number of lamps which continue to operate at a given time under defined conditions and switching frequency;

d) “Lamp lifetime”, which is the period of operation time after which the fraction of the total number of lamps which continue to operate corresponds to the lamp survival factor of the lamp, under defined conditions and switching frequency;

e) "Chromaticity", which is the property of a colour stimulus defined by its chromaticity coordinates, or by its dominant or complementary wavelength and purity taken together;

f) "Luminous flux", which is a quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye;

g) "Correlated Colour Temperature" (Tc [K]), which is 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;

h) "Colour rendering" (Ra), which is the effect of an illuminant on the colour appearance of objects by conscious or subconscious comparison with their colour appearance under a reference illuminant;

i) "Specific effective radiant UV power", which is the effective power of the UV radiation of a lamp related to its luminous flux (unit: mW/klm);

j) "Lamp start time", which is the time needed for the lamp to start emitting light after the user has activated it;

k) "Lamp warmup time", which is the time needed for the lamp after start-up to emit a given proportion of its full luminous flux;

l) "Power factor", which is the ratio of the absolute value of the active power to the apparent power under periodic conditions,

m) “Luminance”, which is the amount of light that passes through or is emitted from a particular area, and falls within a given solid angle (unit: cd/m^2)

n) “Lamp mercury content”, which is the mercury contained in the lamp and is measured according to the Annex of Commission Decision 2002/747/EC;

2. DEFINITIONS

a) "White light source" is a light source having chromaticity coordinates (x, y) that satisfy the following requirement:

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

b) a "rated" value is 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;

c) a "nominal" value is an approximate quantity value used to designate or identify a product;

d) “Second lamp envelope” is 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 discharge tubes of discharge lamps shall not count as a lamp envelope;

e) ”Clear lamp” is a lamp (excluding compact fluorescent lamps) with a luminance above 25000 cd/m^2 for lamps having a luminous flux below 2000 lm and above 100000 cd/m^2 for lamps having more luminous flux, equipped with only transparent envelopes in which the light producing filament, diode or discharge tube is clearly visible.

f) “Switching cycle” is the sequence of switching on and switching off the lamp with defined intervals. For the purposes of testing lamp lifetime and lumen maintenance under this Regulation, the switching cycle shall consist of 1 minute on and 3 minutes off periods.

g) "Premature failure" is the phenomenon when a lamp reaches its end of life after a period in operation which is less than the rated life time claimed in the technical documentation;

ANNEX III
Ecodesign requirements for non-directional household lamps

1. LAMP EFFICACY REQUIREMENTS

The lamp efficacy requirements shall not apply to the following categories of lamps:

a) lamps with other lamp caps than E14/E27/B22/B15, a rated luminous flux less than 100 lumen and a rated lamp power equal to or less than 15 W;

b) lamps other than clear lamps (non-clear lamps) with lamp cap E14/E27/B22/B15, a rated luminous flux less than 150 lumen and a rated lamp power equal to or less than 20W;

c) clear lamps with lamp cap E14/E27/B22/B15, a rated luminous flux less than 200 lumen and a rated lamp power equal to or less than 25 W.

The following lamps shall be exempted from the efficacy requirements of Stage 1 and Stage 2, but not from Stage 3:

d) incandescent lamps with E14/E27/B22/B15 cap, with a voltage equal to or below 60 volts and without integrated transformer;

e) incandescent lamps with S14, S15 or S19 cap;

f) incandescent lamps with G4/E27/B22d/GY6.35 cap that are vibration resistant and are designed to operate in a position other than vertical.

The maximum rated power (P_{max}) for a given rated luminous flux (Φ) is provided in Table 1.

The exceptions to these requirements are listed in Table 2 and the correction factors applicable to the maximum rated power in Table 3.

Table 1

Application date	Maximum rated power (P_{max}) for a given rated luminous flux (Φ) (W)	
	Clear lamps	Non-clear lamps
Stage 1	$0.8 * (0.88\sqrt{\Phi}+0.049\Phi)$	$0.24\sqrt{\Phi}+0.0103\Phi$
Stage 2	$0.8 * (0.88\sqrt{\Phi}+0.049\Phi)$	$0.24\sqrt{\Phi}+0.0103\Phi$
Stage 3	$0.4 * (0.88\sqrt{\Phi}+0.049\Phi)$	$0.24\sqrt{\Phi}+0.0103\Phi$

Table 2

Exceptions	
Scope of the exception	**Maximum rated power (W)**
All lamps 200 lm ≤ Φ ≤ 450 lm in Stage 1	P_{max} = 1.1 * (0.88√Φ+0.049Φ)
Clear lamps with G9 or R7s cap in Stage 3	P_{max} = 0.8 * (0.88√Φ+0.049Φ)

The correction factors in table 3 are cumulative and also applicable to the products covered by the exceptions of Table 2.

Table 3

Correction factors	
Scope of the correction	**Maximum rated power (W)**
filament lamp requiring external power supply	P_{max} / 1.06
discharge lamp with colour rendering index ≥ 80 and <90	P_{max} / 1.0
discharge lamp with colour rendering index ≥ 90	P_{max} / 0.85
discharge lamp with colour rendering index ≥ 90 and Tc >=5000K	P_{max} / 1.1
discharge lamp with second envelope	P_{max} / 0.95
light emitting diode requiring external power supply	P_{max} / 1.1

2. LAMP FUNCTIONALITY REQUIREMENTS

The lamp functionality requirements are set out in Table 4 for compact fluorescent lamps and in Table 5 for all other lamps covered by this Regulation which do not fulfil the efficacy requirement applicable to non-clear lamps in Stage 2 according to Annex III.1.

In case the rated lamp lifetime is higher than 2000h, the Stage 1 requirements for the parameters "Rated lamp lifetime" and "Lumen maintenance" in Tables 4 and 5 are only applicable as from Stage 2.

Table 4 – Functionality requirements for compact fluorescent lamps

Functionality parameter	Stage 1	Stage 3
Rated lamp lifetime	≥ 6000h Lamp Survival Factor ≥ 0.5	≥ 6000h Lamp Survival Factor ≥ 0.7
Lumen maintenance	At 2000h : ≥ 85% (≥ 80% for lamps with second lamp envelope)	At 2000h: ≥ 88% (≥ 83% for lamps with second lamp envelope) At 6000h: ≥70%
Number of switching cycles	≥ half the lamp lifetime expressed in hours ≥ 10,000 if lamp starting time > 0,3s	≥ lamp lifetime expressed in hours ≥ 50,000 if lamp starting time > 0,3s
Starting time	< 2,0s	< 1,0s
Lamp warm-up time to 60% Φ	< 60s	< 40s or < 100s for lamps containing mercury in amalgam form
Premature failure rate	≤ 2% at 200h	≤ 1% at 200h
UVA+UVB radiation	≤ 2 mW/klm	≤ 2 mW/klm
UVC radiation	≤ 0.01 mW/klm	≤ 0.01 mW/klm
Lamp power factor	≥ 0.50	≥ 0.60
Colour rendering (Ra)	≥ 80	≥ 80

Table 5 – Functionality requirements for lamps other than compact fluorescent lamps and not fulfilling the efficacy requirement applicable to non-clear lamps in Stage 2 according to Annex III.1

Functionality parameter	Stage 1	Stage 3
Rated lamp lifetime	≥ 1000h Lamp Survival Factor ≥ 0.5	≥ 2000h Lamp Survival Factor ≥ 0.5
Lumen maintenance	≥ 85% at 75% of rated average lifetime	≥ 85% at 75% of rated average lifetime
Number of switching cycles	≥ four times the rated lamp life expressed in hours	≥ four times the rated lamp life expressed in hours
Starting time	< 0.2s	< 0.2s
Lamp warm-up time to 60% Φ	≤ 1,0s	≤ 1,0s
Premature failure rate	≤ 5%@100h	≤ 2%@100h
UVA+UVB radiation	≤ 2 mW/klm	≤ 2 mW/klm
UVC radiation	≤ 0.01 mW/klm	≤ 0.01 mW/klm
Lamp power factor	≥ 0.95	≥ 0.95

3. PRODUCT INFORMATION REQUIREMENTS ON LAMPS

Manufacturers shall provide the information listed below as from Stage 1, except where otherwise stipulated. It shall also be contained in the technical documentation file drawn up for the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC.

3.1. Information available to the end-users at the moment of purchase and on free access websites

The information does not need to be specified using the exact wording of the list below. As far as possible it shall be displayed in a language free manner.

a) When the nominal lamp power is displayed outside the energy label in accordance with Directive 98/11/EC, the nominal luminous flux of the lamp shall be also displayed separately in a font at least twice as large as the nominal lamp power display outside the label;

b) Nominal life time of the lamp in hours (not higher than the rated life time).

c) Number of switching cycles before premature lamp failure;

d) Colour temperature (does not need to be expressed as a value);

e) Colour rendering (does not need to be expressed as a value). Only CRI = 100 can be shown as excellent or perfect, only CRI ≥ 90 can be shown as good or improved, and CRI < 80 must be shown as poor;

f) Warm-up time up to 80% of the full light output (may be indicated as "instant full light" if less than 1 second)

g) A warning if the lamps cannot be dimmed or can be dimmed only on specific dimmers;

h) If designed for optimal use in non-standard conditions (such as ambient temperature Ta ≠ 25 °C), information on those conditions;

i) Lamp dimensions in millimeters (length and diameter);

j) If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1W) shall be that corresponding in Table 5 to the luminous flux of the lamp contained in the packaging.

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

Table 6

Rated lamp luminous flux Φ [lm]			**Claimed equivalent incandescent lamp power**
CFL	**Halogen**	**LED and other lamps**	**[W]**
125	119	136	15
229	217	249	25
432	410	470	40
741	702	806	60
970	920	1055	75
1398	1326	1521	100
2253	2137	2452	150
3172	3009	3452	200

k) The term "energy saving lamp" or any similar product related promotional statement about lamp efficacy can only be provided if the efficacy requirements applicable to non-clear lamps in Stage 2 according to Annex III.1 are met by the lamp.

3.2. Information to be made publicly available on free-access websites

The information shall also be expressed as values.

a) The information specified in Annex III.3.1;

b) Rated wattage (0.1 W precision);

c) Rated luminous flux;

d) Rated lamp life time (from Stage 2 if lifetime > 2000 h);

e) Lamp power factor;

f) Lumen maintenance factor at the end of the nominal life (from Stage 2 if lifetime > 2000 h)

g) Starting time (seconds);

If the lamp contains mercury:

i) Lamp mercury content as X,X mg;

j) Instructions on how to clean up the lamp debris in case of accidental lamp breakage.

ANNEX IV
Verification procedure for market surveillance purposes

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

Member State authorities shall test a sample batch of minimum twenty lamps of the same model from the same manufacturer, randomly selected from four different points of sale.

The batch shall be considered to comply with the provisions set out in Annex III 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 the purposes of checking conformity with the requirements, Member States shall use the measurement methods defined in the following documents:

a) Luminous efficacy: EN 50285;

b) Lamp Lumen Maintenance Factor (LLMF): guide 97 of the International Commission on Illumination;

c) Lamp Survival Factor (LSF): guide 97 of the International Commission on Illumination;

d) Lamp lifetime: EN 60357, EN 60064, EN 60969;

e) Chromaticity: publication 15 of the International Commission on Illumination;

f) Luminous flux: technical report 84 of the International Commission on Illumination;

g) Correlated Colour Temperature (Tc [K]): publication 15 of the International Commission on Illumination;

h) Colour rendering: technical report 13.3-1995 of the International Commission on Illumination;

i) Specific effective radiant UV power: IEC 62471;

j) Lamp start time: EN 60969;

k) Lamp warmup time: EN 60969;

l) Power factor: IEC 61000-3-2;

m) Luminance: publication 18 of the International Commission on Illumination;

n) Lamp mercury content: the Annex of Commission Decision 2002/747/EC

o) Lamp caps: EN 60061

ANNEX V
Indicative benchmarks for non-directional household lamps

(for information)

At the time of adoption of this Regulation, the best available technology on the market for the products concerned was identified as follows.

1. LAMP EFFICACY

The highest identified efficacy was 69 lm/W.

2. LAMP FUNCTIONALITY

Table 7

Functionality parameter	Compact fluorescent lamps
Rated lamp lifetime	20000 h
Lumen maintenance	90% at the rated lamp lifetime
Number of switching cycles	Unlimited with versions that have a start delay
Starting time	<0,1s
Lamp warm-up time to 80% Φ	15s or 4 s for special mixed CFL / halogen lamps
Lamp power factor	0,95

3. LAMP MERCURY CONTENT

The energy efficient compact fluorescent lamps with the lowest mercury content include not more than 1 mg mercury.