



LIGHTINGEUROPE

THE VOICE OF THE LIGHTING INDUSTRY

Guidelines

For the application of
Commission Regulation
(EU) 2019/2020 of 5
December 2019 laying down
ecodesign requirements for
light sources and separate
control gears (Single
Lighting Regulation)

16 April 2021
Version 3

This is a registered copy for the exclusive use of the members of Agoria – April 2021

Terms and Conditions of Use

Thank you for viewing these LightingEurope guidelines. By accessing and using these guidelines, you agree to be bound by the following Terms and Conditions of Use. If you do not accept to be bound by the Terms and Conditions of Use, you must not use these guidelines in any possible way and delete the file immediately. In the event of violation of the Terms and Conditions of Use, LightingEurope reserves the right to seek all legal remedies available for such violations.

The content of these guidelines is owned by LightingEurope. It is protected by EU and international copyright, trademark, and other intellectual property or proprietary rights legislation.

LightingEurope authorises the organisation(s) mentioned at the top of this page to view, copy, download, or print content available in these guidelines, only for exclusive use within that organisation.

Any unauthorised copying, alteration, distribution, transmission, performance, display, or use of these guidelines is prohibited. Any third-party texts (i.e., legal texts, which are publicly available), trademarks, service marks, and logos are the property of their respective owners. Any further rights not specifically granted herein are reserved.

© Copyright LightingEurope

Table of Contents

Table of Contents	3
Changes in Version 3.0	4
Letter from the President	6
Preface	7
Disclaimer	7
Introduction	9
Act on ecodesign for light sources and control gear	11
Preamble	11
Article 1: Subject matter and scope	14
Article 2: Definitions	16
Article 3: Ecodesign requirements	25
Article 4: Removal of light sources and separate control gears	25
Article 5: Conformity assessment	31
Article 6: Verification procedure for market surveillance purposes	32
Article 7: Circumvention	32
Article 8: Indicative benchmarks	33
Article 9: Review	33
Article 10: Repeal	34
Article 11: Entry into force and application	34
Article 12: Transitional compliance equivalence	35
Annexes	36
Annex I: Definitions applicable for the Annexes	36
Annex II: Ecodesign requirements	53
Annex III: Exemptions	70
Annex IV: Verification procedure for market surveillance purposes	77
Annex V: Functionality after endurance testing	81
Annex VI: Benchmarks	83
Summary of main ecodesign requirements by product type	84
Light sources and separate control gears	84
Containing products	86

Changes in Version 3.0

The first version of the Guidelines was published on 5 December 2019, alongside the publication of Regulation (EU) No 2019/2020 on the ecodesign requirements for light sources and separate control gear. Since then, LightingEurope has received various questions and requests for more information, which are being answered in this second version of the Guidelines.

Additionally, on 24 February 2020, the European Commission published a corrigendum with corrections to the legislative text of 5 December 2019. The changes brought by this corrigendum have also been reflected in this second version of the Guidelines. Following discussions between the European Commission, Member States, and industry stakeholders, including LightingEurope, an omnibus amendment was agreed upon by the European Commission and Member States, which was published on 26 February 2021 as Regulation (EU) No 2021/341.

Below is a table of changes that have been made in comparison with the second version.

▪ Preface	Corrected text
▪ Introduction	Corrected text
▪ Comment to Preamble, para. 19	New comment
▪ Comment to Article 1(1)(b)	Updated comment
▪ Comment to Article 2(1)(1 st a)	Corrected spelling
▪ Article 2(4)	Updated definition
▪ Comment to Article 2(4)	Updated comment
▪ Comment to Article 2(10)	Extended comment
▪ Article 4(1), 2 nd para.	Updated and new text
▪ Comment to Article 4(1), 2 nd para.	Updated comment
▪ Comment to Article 4(2)	Updated comment
▪ Article 7	Updated and new text
▪ Article 12	New text
▪ Comment to Annex I(17)	Extended comment
▪ Comment to Annex I(29)	Extended comment
▪ Annex I(52)	Updated definition
▪ Annex II(1)(a)	Corrected formula
▪ Comment to Annex II(1)(a)	Corrected spelling

- Comment to Annex II(1)(b) Extended comment
- Comment to Annex II(2), Table 4 Corrected spelling
- Comment to Annex II(2), Table 4 Corrected spelling
- Comment to Annex II(2), Table 4 Corrected spelling
- Annex II(2), Table 4 Changed requirements
- Comment to Annex II(2), Table 4 Corrected spelling
- Comment to Annex II(3)(a) New comment
- Annex II(3)(d) Corrected text
- Annex III(1)(c) Updated text
- Annex III(3)(s) Updated and new text
- Annex III(3)(w) Updated and new text
- Annex III(3)(x) New text
- Annex III(5) New text
- Annex IV Updated text
- Annex IV(1) Updated text
- Annex IV(2)(d) New text
- Annex IV(2)(e) New text
- Annex IV(3) Updated text
- Annex IV(4) Updated text
- Annex IV, Table 6 Changed requirement
- Comment to Annex IV New comment

Letter from the President

As President of LightingEurope, I am honoured to present to you these Guidelines for the application of Commission Regulation (EU) No 2019/2020 laying down ecodesign requirements for light sources and separate control gears. By publishing these Guidelines and through our analysis and interpretation, we aim to help all lighting sector stakeholders enhance their understanding of the Regulation.

These Guidelines come at a time when the lighting industry is experiencing remarkable shift towards connected, personalised, and increasingly efficient and circular products. This 'revolution' is changing the characteristics of lighting both as a product and as a service. Within this context, LightingEurope drafted these Guidelines to ensure the lighting sector has a full understanding of the Regulation and, based on this understanding, is well-positioned to leverage the changes happening in the industry.

I am especially pleased to point out that these Guidelines are the result of a collaborative effort. They represent LightingEurope's combined industry knowledge and were drafted based on the valuable input of our members, lighting companies and national lighting associations, and in consultation with stakeholders, the European Commission and its Member States.

But these Guidelines are just a starting point, and we encourage everyone involved in their drafting to join forces with our organisation and ensure that all aspects of our highly diverse industry are represented. After all, cooperation is crucial to meeting the challenges and opportunities created by innovative lighting technology and an evolving regulatory framework.

When we started our work with the European Commission and its consultants in 2015, our motto was 'simplify to better enforce.' As to simplification, we let you be the judge on whether the new Regulation meets this goal. But on the topic of enforcement, we ask everyone involved in market surveillance, whether it be at the European or Member State level, to invest both the time and resources needed to ensure the Regulation is enforced.

Enforcement is key to achieving a level playing field - which is essential to the success of our economy. These Guidelines are our contribution to the enforcement effort.

Yours sincerely,

Lionel Brunet

LightingEurope President

Preface

LightingEurope is the association representing the lighting industry in Europe. We are the voice of more than 1000 lighting companies that employ more than 100 000 Europeans and create an annual European turnover of over € 20 billion. Our daily mission is to advocate and defend the lighting industry in Brussels, while reconciling it with ongoing EU policy aims. LightingEurope is committed to innovation, sustainability, quality and leadership, and we help shape policy and establish industry standards and guidelines. In doing so, we are dedicated to promoting efficient lighting practices for the benefit of the global environment, human comfort, and the health and safety of consumers. More information is available at: www.lightingeurope.org.

These Guidelines are intended to assist the market in understanding the Commission Regulation (EU) No 2019/2020 on ecodesign requirements for light sources and separate control gears. Starting from 1 September 2021, this Regulation is applicable and replaces and repeals Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012.

Both the new ecodesign requirements and energy labelling legislation (explained in a separate LightingEurope document published alongside these Guidelines) have been drafted by the European Commission services with the aim of improving market surveillance actions. This intention to strengthen enforcement is in line with and indispensable from what LightingEurope aims to achieve: a level playing field for manufacturers operating in the European lighting market. Achieving this requires a simplification of the ecodesign rules on the one hand (to reduce administrative burdens by manufacturers and authorities alike), and the simplification of verification legislation on the other (to enable swifter market surveillance actions).

Disclaimer

The information provided in these Guidelines is the interpretation of the Regulation as understood by the members of LightingEurope and by no means represents an official interpretation of the requirements set by the Regulation itself. While we have made every attempt to ensure that the information has been obtained from reliable sources, LightingEurope is not responsible for any errors or omissions, or for the results obtained from the use of this information.

The content of this document is a recommendation only and is not binding to any party. LightingEurope members are not bound to adhere to this document. All information is provided with no guarantee of completeness, accuracy, timeliness, or of the results obtained from the use of this information, and without warranty of any kind, express or implied, including, but not limited to, warranties of performance, merchantability, and

fitness for a particular purpose.

In no event will LightingEurope, its related partnerships or corporations, or the partners, agents, or employees thereof be liable to you or anyone else for any decision made or action taken in reliance on the information or for any consequential, special, or similar damages, even if advised of the possibility of such damages.

Introduction

Regulation (EU) No 2019/2020 on ecodesign requirements for light sources and separate control gears replaces and repeals Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 as of 1 September 2021. By merging and revising three existing regulations on lighting, the legislation will become simpler and easier to implement. Nevertheless, for an untrained eye, questions may arise on the interpretation and application of the Regulation. Therefore, as is already an established practice, LightingEurope has released these Guidelines to help the market, at all levels of the supply chain, enforce these new and highly technical requirements. By doing so, we hope to help achieve a better application and enforcement of the requirements applicable to lighting products.

Some of the changes in the legislation and requirements are as follows:

- The scope has been changed to encompass 'light sources' (incl. lamps, (O) LEDs, and (O)LED modules) and 'containing products' (incl. luminaires, fridges, shelves), as opposed to 'lamps' and 'luminaires.' However, please keep in mind that when these Guidelines refer to containing products, we specifically speak about luminaires. This is because LightingEurope can only speak for the lighting industry and not for producers of other appliances.
- Circular Economy requirements have been introduced on containing products. More specifically, LED-based containing products will have to adhere to certain removability and replaceability requirements (unless a technical justification is provided). Similar and more stringent requirements have been introduced to the revised ecodesign requirements for other product groups, including washing machines, dishwashers, and displays.
- Various light source types will be phased out. For example, halogen R7s > 2700 lm lamps will be phased out starting 1 September 2021, and halogen G9 -, G4 - and GY6.35 capped lamps and fluorescent T8 lamps will be phased out starting 1 September 2023.

The ecodesign requirements are mandatory and apply to all products placed on the European market (or put into service) wherever they are installed. Products falling within the scope of this Regulation shall bear the CE marking and the manufacturer's Declaration of Conformity shall mention a reference to this Regulation as well as to Directive 2009/125/EC.

Concerning the latter points, they also apply to products that are defined as exemptions and are not subjected to the specific ecodesign requirements set out in the Regulation. Even if the product is exempt from the Regulation, it shall be CE-marked and contain a

reference to the relevant legislation in the Declaration of Conformity. Those requirements, along with many more, are clarified in these Guidelines.

All above mentioned points are listed in these Guidelines in their original wording, and the base text of this document is exactly as can be found in the new consolidated version of the Regulation (including the amendments from the Commission Corrigendum published on 24 February 2020 and the omnibus amendments from Regulation (EU) No 2021/341). For easy recognition, the comments, and explanations by LightingEurope have been added in green boxes behind the relevant clauses.

Regulation (EU) No 2019/2020 is available on the [following website of the European Commission](#).

All information about the ecodesign regulations can be found on the [European Commission website](#).

Act on ecodesign for light sources and control gear

Preamble

THE EUROPEAN COMMISSION,

Having regard to Article 114 of the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products, and in particular Article 15(1) thereof,

Whereas:

1. Pursuant to Directive 2009/125/EC the Commission should set ecodesign requirements for energy-related products which account for significant volumes of sales and trade in the Union and which have a significant environmental impact and presenting significant potential for improvement through design in terms of their environmental impact, without entailing excessive costs.
2. The Ecodesign Working Plan 2016-2019 established by the Commission in application of Article 16(1) of Directive 2009/125/EC sets out the working priorities under the ecodesign and energy labelling framework for the period 2016-2019. The Working Plan identifies the energy-related product groups to be considered as priorities for the undertaking of preparatory studies and eventual adoption of implementing measures, as well as the review of the current regulations.
3. Measures from the Working Plan have an estimated potential to deliver a total in excess of 260 TWh of annual final energy savings in 2030, which is equivalent to reducing greenhouse gas emissions by approximately 100 million tonnes per year in 2030. Lighting is one of the product groups listed in the Working Plan, with an estimated 41.9 TWh of annual final energy savings in 2030.
4. The Commission established ecodesign requirements for lighting products in Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012. Pursuant to those Regulations the Commission should review them in the light of technological progress.
5. The Commission has reviewed those Regulations and analysed the technical, environmental and economic aspects of lighting products as well as real-life user behaviour. The review was carried out in close cooperation with stakeholders and interested parties from the Union and third countries. The results of the review were made public and presented to the Consultation Forum established by Article

18 of Directive 2009/125/EC.

6. The review shows the benefit of updating the requirements for lighting products and the benefit of simplifying the requirements to be applied to lighting products, in particular by having one single regulation for this product group. This is in line with the Commission's 'Better Regulation' policy and should decrease the administrative burden for manufacturers and importers, and to facilitate verification by market surveillance authorities, inter alia by better defining the scope and exemptions, reducing the number of parameters for compliance testing and decreasing the time of some test procedures.
7. In accordance with the review, broadly, all lighting products that fall within the scope of the three existing regulations should be covered by this Regulation. Furthermore, a uniform formula should be set to calculate the energy efficiency of such lighting products.
8. The annual electricity consumption of products subject to this Regulation in the Union was estimated at 336 TWh in 2015. This covers 12.4 % of the overall use of electricity by the 28 Member States and corresponds to 132 million tonnes of CO₂ equivalent greenhouse gas emissions. The energy consumption of lighting products in a business-as-usual scenario is projected to decrease by 2030. However, this reduction is expected to slow down unless the existing ecodesign requirements are updated.
9. The environmental aspects of lighting products that have been identified as significant for the purposes of this Regulation are energy consumption in the use phase along with mercury content.
10. The use of hazardous substances, including mercury in light sources, is governed by Directive 2011/65/EU of the European Parliament and of the Council (RoHS). No specific ecodesign requirements on mercury content should therefore be set in this Regulation.
11. The Commission Communication on the circular economy and the Working Plan underline the importance of using the ecodesign framework to support the move towards more resource efficient and circular economy. Directive 2012/19/EU of the European Parliament and of the Council refers to Directive 2009/125/EC and indicates that ecodesign requirements should facilitate the re-use, dismantling and recovery of waste of electrical and electronic equipment (WEEE) by tackling the issues upstream. The WEEE Directive sets requirements for separate collection and recycling of lighting products, with new provisions from August 2018. This Regulation should therefore not lay down further requirements for this. At the same time, this Regulation supports the repairability of products containing light sources.

12. In view of the need to promote the circular economy and the ongoing work for material efficiency standardisation in relation to energy-related products, future standardisation work should also address the modularisation of LED lighting products, including aspects such as luminous flux, radiation spectrum and light distribution.
13. Specific requirements for the standby and networked standby electric power demand of lighting products should be laid down. Therefore, the requirements of Commission Regulation (EC) No 1275/2008 should not apply to lighting products covered by the scope of this Regulation.
14. Mandatory ecodesign requirements apply to products placed on the Union market wherever they are installed or used and should therefore not be made dependent on the application in which the product is used.
15. Exemptions from the requirements set out in this Regulation should be made for light sources with special technical features for use in specific applications, including those related to health and safety, and for which higher energy efficiency alternatives are not available or not cost-effective.
16. The relevant product parameters should be measured using reliable, accurate and reproducible methods. Those methods should take into account recognised state-of-the-art measurement methods, including, where available, harmonised standards adopted by the European standardisation organisations, as listed in Annex I to Regulation (EU) No 1025/2012 of the European Parliament and of the Council.
17. In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.
18. To facilitate compliance checks, manufacturers, importers or authorised representatives should provide information in the technical documentation referred to in Annexes IV and V to Directive 2009/125/EC in so far as that information relates to the requirements laid down in this Regulation. The parameters of the technical documentation in accordance with this Regulation which are identical to the parameters of the product information sheet in accordance with Commission Delegated Regulation (EU) 2019/2015 and which have been entered in the product database established by Regulation (EU) 2017/1369 should no longer be included in the technical documentation of this Regulation.
19. This Regulation should specify tolerance values for lighting parameters taking into account the approach to information declaration laid down in Commission Regulation (EU) 2016/2282.

LightingEurope comment:

The approach referred to in this Preamble is laid down in Preamble Paragraphs 1 - 3 and 5 of Regulation (EU) 2016/2282. This clarifies the approach that the verification tolerances are intended to be only used by the market surveillance authorities.

20. To improve the effectiveness of this Regulation and to protect consumers, products that automatically alter their performance in test conditions to improve the declared parameters should be prohibited.
21. In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to make information on products' environmental performance over their life cycle subject to this Regulation widely available and easily accessible, in accordance with Directive 2009/125/EC, Annex 1, part 3, point 2.
22. A review of this Regulation should assess the appropriateness and effectiveness of its provisions in achieving its goals. The timing of the review should allow for all provisions to be implemented and show an effect on the market.

LightingEurope comment:

Given that the requirements will not become applicable before 1 September 2021 (and in certain cases 1 September 2023), LightingEurope expects that the review will start no later than mid-2024.

23. Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 should therefore be repealed.
24. The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC.

HAS ADOPTED THIS REGULATION:

Article 1: Subject matter and scope

1. This Regulation establishes ecodesign requirements for the placing on the market of
 - a. light sources;
 - b. separate control gears.The requirements also apply to light sources and separate control gears placed on the market in a containing product.

LightingEurope comment:

The supplier of a containing product who is placing a light source and a separate control gear on the market needs to ensure that the light source and separate control gear comply with the applicable EU legislation, and in particular with this regulation.

When the containing product is placed on the market in a packaging that includes electrical lamps or LED modules and/or separate control gears that have already been placed on the market by another European market operator (supplier) with CE marking, the supplier of the containing product will be considered a distributor of the electrical lamps or LED modules and/or separate control gears in the containing product. As such, they must fulfil the specific obligations in Regulation 768/2008, Article R5 'Obligations of distributors.'

Pictures 1-2: examples of light source (lamp) and control gear



2. This Regulation shall not apply to light sources and separate control gears specified in points 1 and 2 of Annex III.

LightingEurope comment:

Annex III.1 describes the light sources and separate control gears exempt from the Regulation based on a legislative reference (e.g., in or on civil aviation aircraft, as set out in Regulation 748/2012).

Annex III.2 describes the light sources and separate control gears exempt from the Regulation based on a specific technology and light source type (e.g., double-capped fluorescent T5 light sources with power $P \leq 13$ W).

3. Light sources and separate control gears specified in point 3 of Annex III shall comply only with the requirements of point 3(e) of Annex II.

LightingEurope comment:

Annex III.1 and Annex III.2 describe the light sources and separate control gears that are out of scope from this Regulation.

Annex III.3 describes the light sources and separate control gears exempt from this

Regulation except for the information required per 3(e) of Annex II.

Article 2: Definitions

For the purpose of this Regulation, the following definitions shall apply:

1. 'light source' means an electrically operated product intended to emit, or, in the case of a non-incandescent light source, intended to be possibly tuned to emit, light, or both, with all of the following optical characteristics:

LightingEurope comment:

What is defined as a 'light source'?

The Regulation defines a 'light source' by providing limitations on a) chromaticity coordinates, b) luminous flux of projected light-emitting surface area, c) luminous flux, and d) colour rendering.

What is not defined as a 'light source' (see second part of Art. 2(1))?

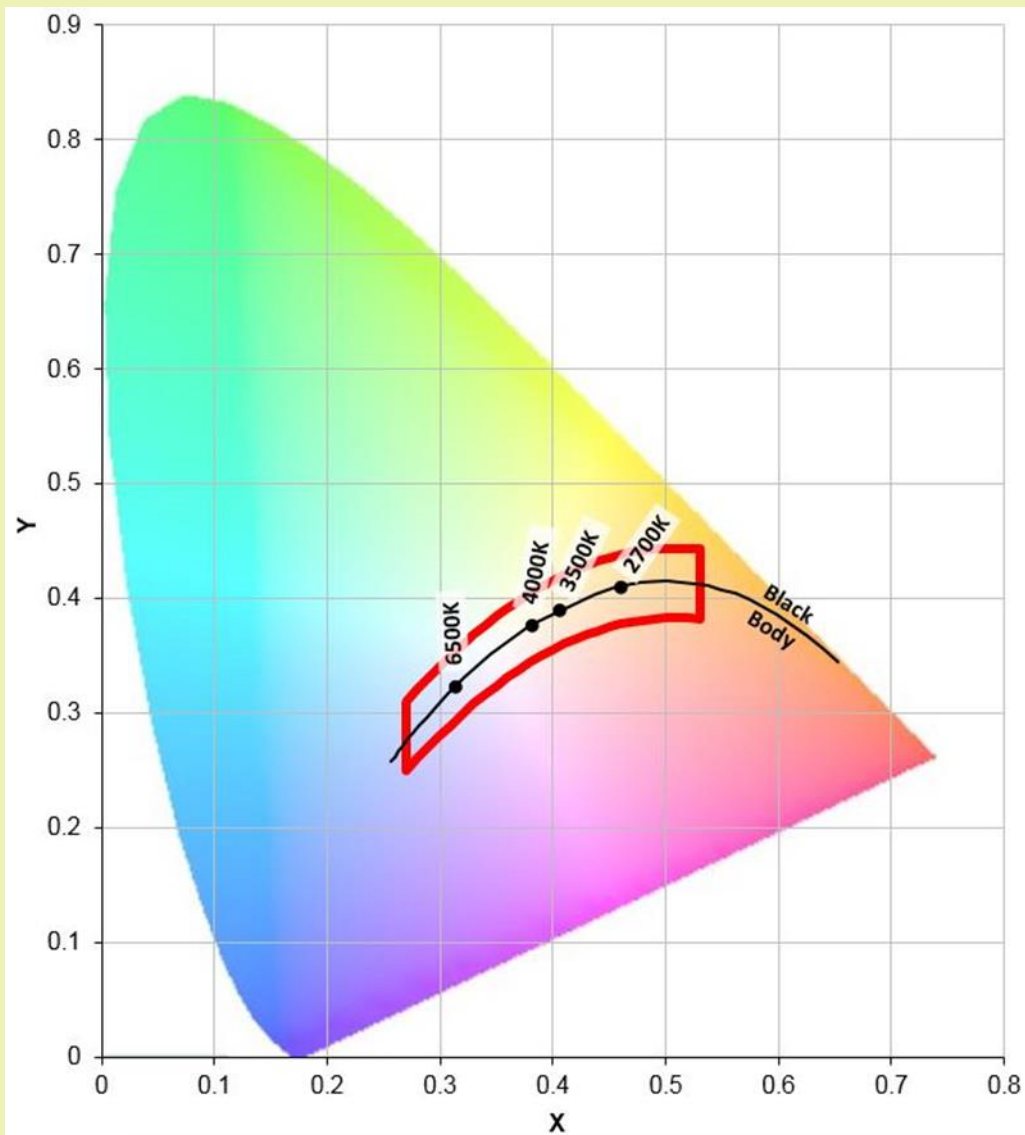
The Regulation lists a) LED dies or LED chips, b) LED packages, c) products containing light sources from which these light sources can be removed for verification, and d) light-emitting parts contained in a light source from which these parts cannot be removed for verification, as not being a 'light source'.

- a. chromaticity coordinates x and y in the range
 $0,270 < x < 0,530$ and
 $- 2,3172 x^2 + 2,3653 x - 0,2199 < y < - 2,3172 x^2 + 2,3653 x - 0,1595;$

LightingEurope comment:

These are the same x,y coordinates as found in Regulations 244/2009 (amended by Regulation 2015/1428), 245/2009 and 1194/2012.

Figure 1: scope range of x,y coordinates



For colour points on the blackbody locus, the range corresponds to a correlated colour temperature between 1940 K and 12 500 K.

- b. a luminous flux < 500 lumen per mm² of projected light-emitting surface area as defined in Annex I;

LightingEurope comment:

This scope limitation excludes light sources with very high luminous emittance that are not reasonably expected to be used in general lighting applications (e.g., laser-based light sources). Projected light-emitting surface area is defined in Annex I solely for the purpose of this scope limitation. State-of-the-art LED-based light sources can achieve up to approximately 300 lm/mm². Therefore, this provision does not currently exclude any LED-based light sources from the scope.

- c. a luminous flux between 60 and 82 000 lumen;

LightingEurope comment:

The lower limit necessarily excludes a huge variety of dashboard, status display and other pilot lights from the scope.

The upper limit necessarily excludes very powerful light sources (e.g., sports lighting; theatre, stage, and studio lighting; and some outdoor and industrial applications). Higher efficiency (LED) light sources are not (yet) readily available for these high-power light sources and end-users tend to be professionals who already pay close attention to energy efficiency.

- d. a colour rendering index (CRI) > 0;

using incandescence, fluorescence, high-intensity discharge, inorganic light emitting diodes (LED) or organic light emitting diodes (OLED), or their combinations as lighting technology, and that can be verified as a light source according to the procedure of Annex IV.

High-pressure sodium (HPS) light sources that do not fulfil condition (a) are considered light sources for the purposes of this Regulation.

LightingEurope comment:

With a CRI requirement of CRI > 0, Low Pressure Sodium Gas Discharge Lamps fall outside the scope of this Regulation.

Light sources do not include:

- a. LED dies or LED chips;

LightingEurope comment:

Article 2(7) of this Regulation clarifies that 'LED die' or 'LED chip' means a small block of light-emitting semiconducting material on which a functional LED circuit is fabricated.

- b. LED packages;

LightingEurope comment:

Article 2(8) of this Regulation defines 'LED package' as a single electric part

principally comprised of at least one LED die. It does not include a control gear (or parts of a control gear), a cap, or active electronic components. Furthermore, it is not connected directly to the mains voltage. It can include one or more of the following: optical elements; light converters (phosphor), thermal, mechanical, and electric interfaces; and/or parts that address electrostatic discharge concerns. Any light-emitting devices intended to be used directly in an LED luminaire are light sources. However, LED packages are not light sources.

- c. products containing light source(s) from which these light source(s) can be removed for verification;

LightingEurope comment:

A light source can be 'extracted' from a containing product as detailed in the Technical Documentation File from the relevant manufacturer. The description of the recommended method can be explained with drawings, text description, and images, all referring to 'commonly available tools.' Extractable parts identified by the containing product manufacturer can include the light source alone or a part consisting of one or more pieces (e.g., LED light source, heat sink, diffuser). References to the 'extractable' parts must also be made by the manufacturers in the Technical Documentation File when the manufacturer is identifying the light source in the Technical Documentation File. The containing products themselves, from which light sources can be removed, are not light sources.

- d. light-emitting parts contained in a light source from which these parts cannot be removed for verification as a light source;

LightingEurope comment:

A light source can be 'extracted' from a containing product as detailed in the Technical Documentation File from the relevant manufacturer. The description of the recommended method can be explained with drawings, text description, and images, all referring to 'commonly available tools.' Extractable parts identified by the containing product manufacturer can include the light source alone or a part consisting of one or more pieces (e.g., LED light source, heat sink, diffuser). References to the 'extractable' parts must also be made by the manufacturers in the Technical Documentation File when the manufacturer is identifying the light source in the Technical Documentation File. Non-extractable light-emitting parts within a light source are not light sources on their own.

Pictures 3-5: Examples of LED light sources for a luminaire



2. 'control gear' means one or more devices, that may or may not be physically integrated in a light source, intended to prepare the mains for the electric format required by one or more specific light sources within boundary conditions set by electric safety and electromagnetic compatibility. It may include transforming the supply and starting voltage, limiting operational and preheating current, preventing cold starting, correcting the power factor and/or reducing radio interference.

The term 'control gear' does not include power supplies within the scope of Commission Regulation (EC) No 278/2009. The term also does not include lighting control parts and non-lighting parts (as defined in Annex I), although such parts may be physically integrated with a control gear or marketed together as a single product.

A Power over Ethernet (PoE) switch is not a control gear in the sense of this Regulation. 'Power-over-Ethernet switch' or 'PoE switch' means equipment for power-supply and data-handling that is installed between the mains and office equipment and/or light sources for the purpose of data transfer and power supply;

3. 'separate control gear', means a control gear that is not physically integrated with a light source and is placed on the market as a separate product or as a part of a containing product;

LightingEurope comment:

Separate control gears (gears not integrated with a light source) can be sold as either individual products ('placed on the market as a separate product') or when mounted in, for example, a luminaire ('placed on the market as a part of a containing product'). This is especially relevant when determining how to measure gear efficiency requirements (see explanation on 'containing product', below).

4. 'containing product' means a product containing one or more light sources, or separate control gears, or both, including, but not limited to, luminaires that can be taken apart to allow separate verification of the contained light source(s), household appliances containing light source(s), furniture (shelves, mirrors, display cabinets) containing light source(s);

LightingEurope comment:

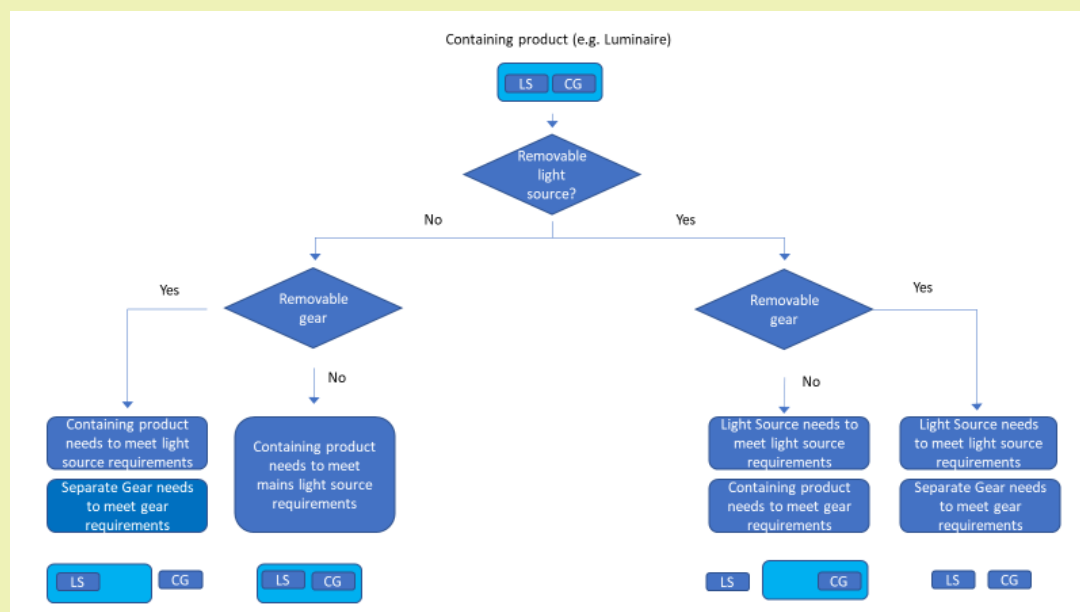
If a containing product cannot be taken apart for verification of the light source or separate control gear (or both), the entire containing product is to be considered respectively a light source or separate control gear (or in case both are non-removable, light source with integrated control gear). See Diagram 1 for an overview of when to assess a product as containing product, light source, or separate control gear.

Pictures 6-7: examples of containing products



Diagram 1 (see below) illustrates whether a containing product should be considered a light source. Additionally, this diagram indicates how to measure gear efficiency.

Diagram 1: Compliance of luminaires, light sources, and control gear on removability



Applicability of Article 4

Due to the definition of Article 2(1) on when a containing product with non-removable light sources and control gear is to be considered a light source for verification purposes, Article 4 does not apply to a containing product that is considered a light source. This is because Article 4 only applies to containing products.

A luminaire without a light source or control gear is not a containing product. In this case, if the luminaire is supplied with a separate standard capped lamp, the lamp sold with the luminaire shall be provided with its packaging and the lamp shall comply with all relevant ecodesign and energy labelling requirements for light sources.

For more information, see our comments under Article 1(1)(b).

5. 'light' means electromagnetic radiation with a wavelength between 380 nm and 780 nm;
6. 'mains' or 'mains voltage' (MV) means the electricity supply of 230 (± 10 %) volt of alternating current at 50 Hz;
7. 'LED die' or 'LED chip' means a small block of light-emitting semiconducting material on which a functional LED circuit is fabricated;
8. 'LED package' means a single electric part comprising principally at least one LED die. It does not include a control gear or parts of it, a cap or active electronic components and is not connected directly to the mains voltage. It can include one or more of the following: optical elements, light converters (phosphors), thermal, mechanical and electric interfaces or parts to address electrostatic discharge concerns. Any light-emitting devices that are intended to be used directly in an LED luminaire, are considered to be light sources;

LightingEurope comment:

Per the last sentence of this paragraph, 'intended use' is a critical factor in determining whether a part is an LED package or a light source. Surface-mount LED packages, which are reflow soldered onto a printed circuit board, are not used 'directly' in an LED luminaire and therefore meet the definition of an LED package. Depending on the intended use, a manufacturer or importer may designate chip-on-board (COB) LEDs as either an LED package or a light source.

9. 'chromaticity' means the property of a colour stimulus defined by its chromaticity coordinates (x and y)

LightingEurope comment:

Standard EN 13032-4 provides an explanation and guidance on calculating the chromaticity coordinates x,y.

10. 'luminous flux' or 'flux' (Φ), expressed in lumen (lm), means the quantity derived from radiant flux (radiant power) by evaluating the electromagnetic radiation in accordance with the spectral sensitivity of the human eye. It refers to the total flux emitted by a light source in a solid angle of 4π steradians under conditions (e.g. current, voltage, temperature) specified in applicable standards. It refers to the initial flux for the undimmed light source after a short operating period, unless it is clearly specified that the flux in a dimmed condition or the flux after a given period of operation is intended. For light sources that can be tuned to emit different light spectra and/or different maximum light intensities, it refers to the flux in the 'reference control settings' as defined in Annex I;

LightingEurope comment:

Standard EN 13032-4 provides an explanation and guidance on calculating the luminous flux.

For CTLS without control gear or lighting control parts, there is no reference control setting defined - and according to Article 2(29) the nominal test conditions as defined by the light source manufacturer apply.

11. 'colour rendering index' (CRI) means a metric quantifying the effect of an illuminant on the colour appearance of objects by conscious or subconscious comparison with their colour appearance under the reference illuminant and is the average Ra of the colour rendering for the first 8 test colours (R1-R8) defined in standards;

LightingEurope comment:

Standard EN 13032-4 provides an explanation and guidance on calculating the CRI. The standard specifies that the CRI calculation be made in accordance with CIE 13.3.

12. 'incandescence' means the phenomenon where light is produced from heat, in light sources typically produced through a threadlike conductor ('filament') which is heated by the passage of an electric current;
13. 'halogen light source' means an incandescent light source with a threadlike conductor made from tungsten surrounded by gas containing halogens or halogen

compounds;

14. 'fluorescence' or 'fluorescent light source' (FL) means the phenomenon or a light source using an electric gas discharge of the low-pressure mercury type in which most of the light is emitted by one or more layers of phosphors excited by the ultraviolet radiation from the discharge. Fluorescent light sources may have one ('single-capped') or two ('double-capped') connections ('caps') to their electricity supply. For the purposes of this Regulation, magnetic induction light sources are also considered as fluorescent light sources;
15. 'high intensity discharge' (HID) means an electric gas discharge in which the light-producing arc is stabilised by wall temperature and the arc chamber has a bulb wall loading in excess of 3 watts per square centimetre. HID light sources are limited to metal halide, high-pressure sodium and mercury vapour types, as defined in Annex I;
16. 'gas discharge' means a phenomenon where light is produced, directly or indirectly, by an electric discharge through a gas, plasma, metal vapour or mixture of gases and vapours;
17. 'inorganic light emitting diode' (LED) means a technology in which light is produced from a solid state device embodying a p-n junction of inorganic material. The junction emits optical radiation when excited by an electric current;
18. 'organic light emitting diode' (OLED) means a technology in which light is produced from a solid state device embodying a p-n junction of organic material. The junction emits optical radiation when excited by an electric current;
19. 'high-pressure sodium light source' (HPS) means a high intensity discharge light source in which the light is produced mainly by radiation from sodium vapour operating at a partial pressure of the order of 10 kilopascals. HPS light sources may have one ('single-ended') or two ('double-ended') connectors to their electricity supply.
20. 'equivalent model' means a model with the same technical characteristics relevant for the ecodesign requirements, but that is placed on the market or put into service by the same manufacturer or importer as another model with a different model identifier;
21. 'model identifier' means the code, usually alphanumeric, which distinguishes a specific product model from other models with the same trade mark or the same manufacturer's or importer's name;
22. 'end-user' means a natural person buying or expected to buy a product for purposes which are outside his trade, business, craft or profession.

For the purposes of the Annexes, additional definitions are set out in Annex I

Article 3: Ecodesign requirements

The ecodesign requirements set out in Annex II shall apply from the dates indicated therein.

Article 4: Removal of light sources and separate control gears

LightingEurope comment:

For the first time, ecodesign requirements for light sources include Circular Economy obligations on the replaceability of components. These obligations are listed in Article 4 of the Regulation.

1. Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be replaced with the use of common available tools and without permanent damage to the containing product, unless a technical justification related to the functionality of the containing product is provided in the technical documentation explaining why the replacement of light sources and separate control gear is not appropriate.

LightingEurope comment:

The replacement of light sources and separate control gear(s) is not applicable to luminaires in, for instance, the following cases:

- If, due to the required technical design of the luminaire, there is no protection against electric shock when replacing the light source or the control-gear.
- If, due to IP protection requirements, the luminaire housing is glued to provide effective protection against the ingress of water, moisture, and foreign bodies (e.g., tools, dirt, etc.).
- If the luminaire is designed in such a way that the light sources could be contaminated and/or damaged during replacement due to dirt particles or electrostatic discharge (ESD) and/or if the method of fixing the light sources could impact its thermal efficiency (heat dissipation).

Examples of the abovementioned include, but are not limited to, luminaires designed in such a way that the optical control is altered, prison cell lighting, and luminaires that could be easily accessed by a child.

Commonly available tools

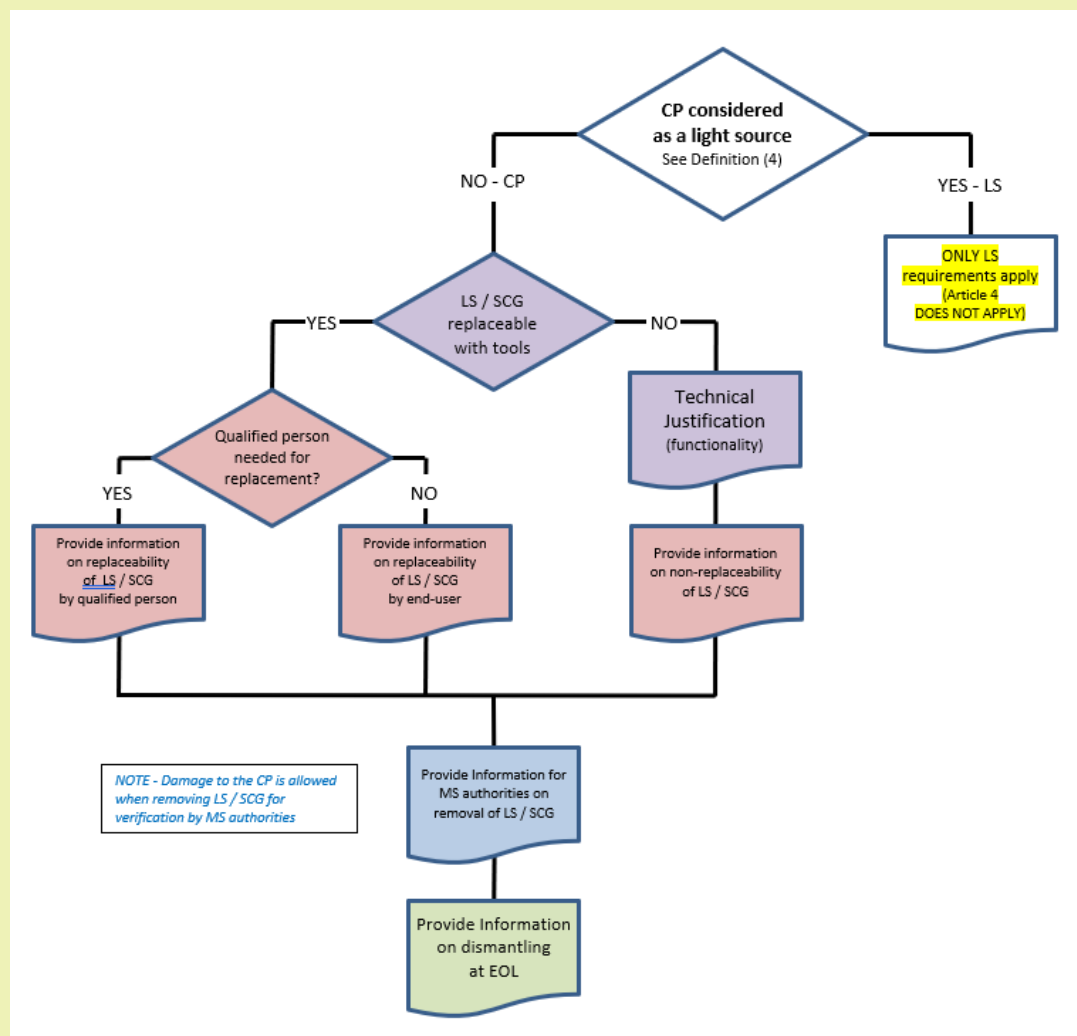
Commonly available tools are tools that are widely available on the European market.

Not included within the scope of commonly available tools is equipment that has been designed for a specific manufacturer or a specific product and is not easily or widely available on the European market.

Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be removed without being permanently damaged for verification purposes by market surveillance authorities. The technical documentation shall provide instructions on how to do this.

LightingEurope comment:

Diagram 2: Applicability overview of Article 4 requirements



Article 2(4): Definition of 'containing products'

“‘Containing product’ means a product containing one or more light sources, or separate control gears, or both, including, but not limited to, luminaires that can be taken apart to allow separate verification of the contained light source(s), household

appliances containing light source(s), furniture (shelves, mirrors, display cabinets) containing light source(s);”

Article 4: Removal of light sources and separate control gears

1. Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be replaced with the use of common available tools and without permanent damage to the containing product, unless a technical justification related to the functionality of the containing product is provided in the technical documentation explaining why the replacement of light sources and separate control gear is not appropriate.

The technical documentation shall also provide instructions on how light sources and separate control gears can be removed without being permanently damaged for verification purposes by market surveillance authorities.

2. Manufacturers, importers or authorised representatives of containing products shall provide information about the replaceability or non-replaceability of light sources and control gears by end-users or qualified persons without permanent damage to the containing product. Such information shall be available on a free-access website. For products sold directly to end-users, this information shall be on the packaging, at least in the form of a pictogram, and in the user instructions.

3. Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be dismantled from containing products at end of life. Dismantling instructions shall be available on a free access website.

A light source can be ‘extracted’ from a containing product as detailed in the Technical Documentation File from the relevant manufacturer. The description of the recommended method can be explained with drawings, text description, and images, all referring to ‘commonly available tools.’ Extractable parts identified by the containing product manufacturer can include the light source alone or a part consisting of one or more pieces (e.g., LED light source, heat sink, diffuser). References to the ‘extractable’ parts must also be made by the manufacturers in the Technical Documentation File when the manufacturer is identifying the light source in the Technical Documentation File.

LightingEurope comment:

The last sentence of Article 2(4) means that, for this specific condition, the entire containing product is defined as a light source and must fulfil the light source requirements set in the Regulation. In LightingEurope's interpretation, the expression "is considered" should be read as 'is' or 'becomes', which means that once the requirement is fulfilled, the containing product ceases to be a containing product and, for all purposes of the Regulation (energy performance requirements, information requirements, etc.) and the 2019/2015 on the energy labelling of light sources, becomes a light source.

Pictures 8-9: examples of containing products



- In case either the light source or control gear are non-removable for verification, the whole containing product needs to fulfil the requirements for light sources or control gear (as relevant). See Diagram 2 above for further information.
- In case both the light source and control gear are non-removable for verification, the containing product needs to fulfil the requirements for light sources.

If a containing product is defined as a light source in accordance with Article 2(1), the requirements of Article 4 ceases to apply for that specific products. For an overview of possible scenarios, please see the overview in the summary on pages 85-88.

LightingEurope's understanding of replaceable, removable for verification, and non-removable

- Replaceable = Component (light source and / or control gear) can be replaced with the use of common available tools and without permanent damage to the containing product
- Removable for verification = Independent from whether it can be replaced, the component (light source and / or control gear) can be removed without permanently damaging the component in order for the component to be verified

by market surveillance authorities

- Non-removable = Component (light source and / or control gear) cannot be removed without permanently damaging the component, so cannot be verified by market surveillance authorities

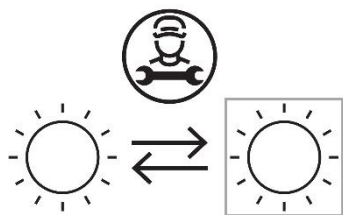
Please note that a replaceable component is also always removable for verification, while a removable component may or may not be replaceable

2. Manufacturers, importers or authorised representatives of containing products shall provide information about the replaceability or non-replaceability of light sources and control gears by end-users or qualified persons without permanent damage to the containing product. Such information shall be available on a free-access website. For products sold directly to end-users, this information shall be on the packaging, at least in the form of a pictogram, and in the user instructions.

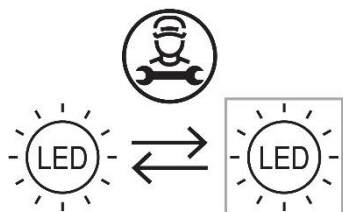
LightingEurope comment:

Placing the following pictograms on the packaging can cover the abovementioned information requirements on the replaceability of light sources and control gear by end-users or qualified persons.

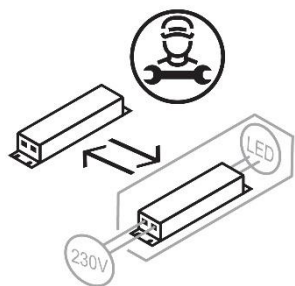
These symbols should not be used on containing products (luminaires) that are considered to be a light source.



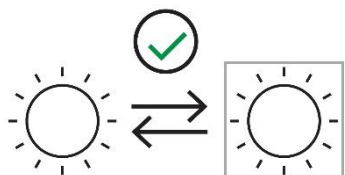
Replaceable light source by a professional



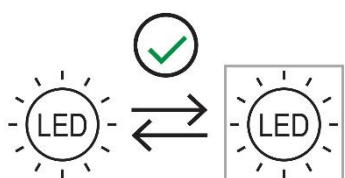
Replaceable (LED only) light source by a professional



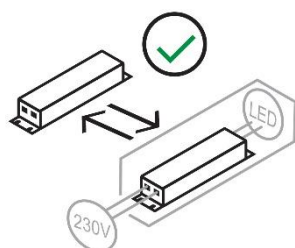
Replaceable control gear by a professional



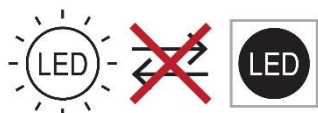
Replaceable light source by an end-user



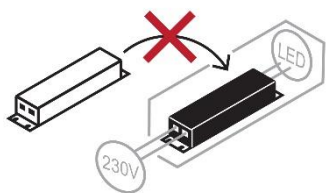
Replaceable (LED only) light source by an end-user



Replaceable control gear by an end-user



Non-replaceable light source



Non-replaceable control gear

Please note that the requirement under Article 4(2) is on replaceability by the end-user and not removability for verification purposes. The pictograms are available in .jpg and .eps format through the following link: <https://www.lightingeurope.org/guidelines>.

3. Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be dismantled from containing products at end of life. Dismantling instructions shall be available on a free access website.

LightingEurope comment:

Example instructions are given in IEC EN 62722-1.

Containing products with non-removable light sources or control gears shall be disposed in accordance with the applicable end-of-life legislation for light sources or separate control gear.

Article 5: Conformity assessment

LightingEurope comment:

Article 5 describes the conformity assessment procedure and refers to Directive 2009/125/EC. In para. 3, technical documentation is required for each product model and each parameter according to para. 3 and calculations according to paras. 1 and 2.

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.
2. For the purposes of the conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation shall contain the information set out in point 3(d) of Annex II to this Regulation and the details and the results of the

calculations in accordance with points 1 and 2 of Annex II, and Annex V to this Regulation.

3. Where the information included in the technical documentation for a particular model has been obtained:
 - a. from a model that has the same technical characteristics relevant for the technical information to be provided but is produced by a different manufacturer, or
 - b. by calculation on the basis of design or extrapolation from another model of the same or a different manufacturer, or both,

the technical documentation shall include details of such calculations or extrapolations, the assessment carried out by the manufacturer to verify the accuracy of the calculations and, where appropriate, the declaration of identity between the models of different manufacturers.

The technical documentation shall include a list of all equivalent models, including the model identifiers.

4. The technical documentation shall include the information in the order and as set out in Annex VI of Regulation (EU) 2019/2015. For market surveillance purposes, manufacturers, importers or authorised representatives may, without prejudice to Annex IV, point 2(g) of Directive 2009/125/EC, refer to the technical documentation uploaded to the product database which contains the same information laid down in Regulation (EU) 2019/2015.

Article 6: Verification procedure for market surveillance purposes

Member States shall apply the verification procedure laid down in Annex IV to this Regulation when performing the market surveillance checks referred to in point 2 of Article 3 of Directive 2009/125/EC.

Article 7: Circumvention

LightingEurope comment:

The prohibition against circumventing the legislation is stated in article 7. This article applies as of the Regulation's entry-into-force.

The manufacturer, importer or authorised representative shall not place on the market products designed to be able to detect they are being tested (for example, by recognising the test conditions or test cycle), and to react specifically by automatically altering their performance during the test with the aim of reaching a more favourable

level for any of the parameters in the technical documentation or included in any of the documentation provided.

The energy consumption of the product and any of the other declared parameters shall not deteriorate after a software or firmware update when measured with the same test standard originally used for the declaration of conformity, except with explicit consent of the end-user prior to the update. No performance change shall occur as a result of rejecting the update.

A software update shall never have the effect of changing the product's performance in a way that makes it non-compliant with the ecodesign requirements applicable for the declaration of conformity.

LightingEurope comment:

Products within the scope of this Regulation that are designed to alter their performance during a verification process so as to change their energy efficiency or functionality are not allowed on the EU market.

Article 8: Indicative benchmarks

The indicative benchmarks for the best-performing products and technologies available on the market at the time of adopting this Regulation are set out in Annex VI.

Article 9: Review

The Commission shall review this Regulation in the light of technological progress and shall present the results of this review, including, if appropriate, a draft revision proposal, to the Consultation Forum no later than 25 December 2024.

This review shall in particular assess the appropriateness of:

- a. setting more stringent energy efficiency requirements for all light source types, in particular for non-LED light source types, and for separate control gears;
- b. setting requirements on lighting control parts;
- c. setting more stringent requirements on flicker and stroboscopic effects, while extending them to separate control gears;
- d. setting requirements on dimming, including the interaction with flicker;
- e. setting more stringent requirements on (networked) standby power;
- f. lowering or abolishing the power bonus for colour-tuneable light sources and removing the exemption for high colour purity;
- g. setting lifetime requirements;

- h. setting improved information requirements concerning lifetime, including for control gears;
- i. substituting the CRI colour rendering metric by a more adequate metric;
- j. verifying the adequacy of lumen as a stand-alone metric for the quantity of visible light;
- k. the exemptions;
- l. setting additional resource efficiency requirements for products in accordance with the principles of the circular economy, especially concerning the removability and exchangeability of light sources and control gears.

Article 10: Repeal

LightingEurope comment:

As the Single Lighting Regulation revises and merges three regulations, the three regulations that it replaces are hence repealed.

Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 are repealed with effect from 1 September 2021.

LightingEurope comment:

Regulation (EC) no 244/2009 covers non-directional household lamps. Regulation (EC) no 245/2009 sets the requirements for fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires capable of operating such lamps. Regulation (EU) no 1194/2012 deals with directional lamps, LEDs, and related equipment. Article 1 in each of the three regulations sets the scope of the Regulation.

All amendments to regulation (EC) no 859/2009 (amending Regulation 244/2009) and Regulation (EU) no 347/2010 (amending Regulation 245/2009) are also repealed.

Article 11: Entry into force and application

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

It shall apply from 1 September 2021. However, Article 7 shall apply from 25 December 2019.

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

Done at Brussels, 1.10.2019

For the Commission

The President

Jean-Claude JUNCKER

Article 12: Transitional compliance equivalence

If no unit belonging to the same model or equivalent models was placed on the market before 1 July 2021, the units of models placed on the market between 1 July 2021 and 31 August 2021 which comply with the provisions of this regulation shall be considered compliant with the requirements of Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012.

Annexes

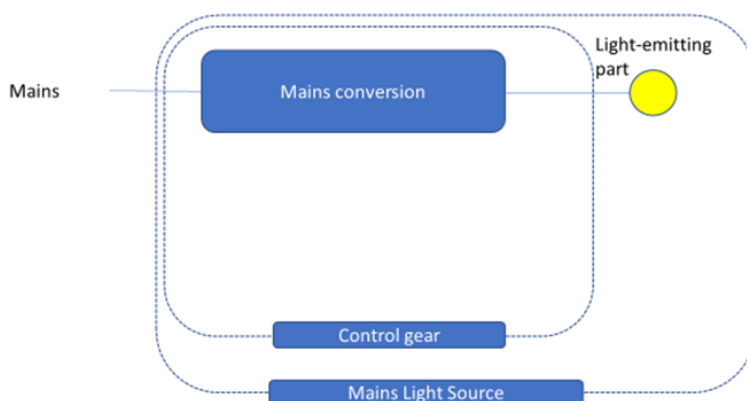
Annex I: Definitions applicable for the Annexes

The following definitions shall apply:

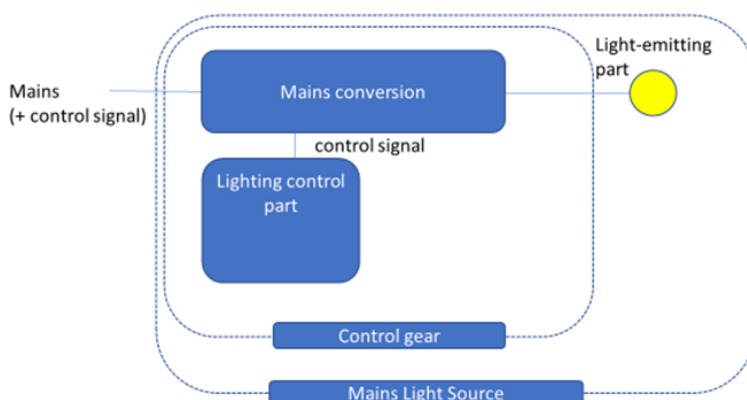
1. 'mains light source (MLS)' means a light source that can be operated directly on the mains electricity supply. Light sources that operate directly on the mains, and can also operate indirectly on the mains using a separate control gear, shall be considered to be mains light sources;

LightingEurope comment:

"Architecture" of definitions. Example of LED mains light source



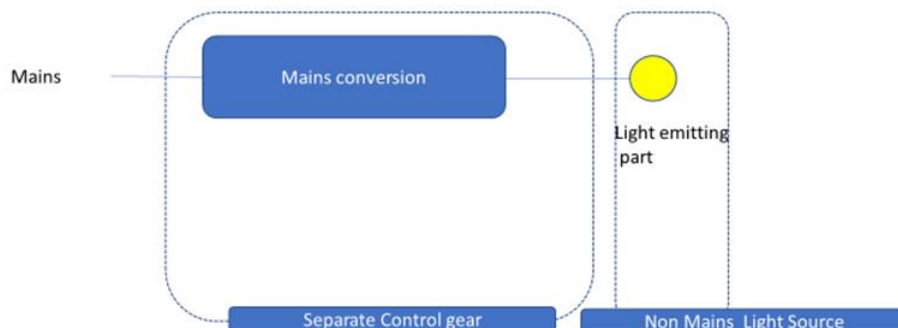
"Architecture" of definitions. Example of LED mains light source with internal dimmer



2. 'non-mains light source (NMLS)' means a light source that requires a separate control gear to operate on the mains;

LightingEurope comment:

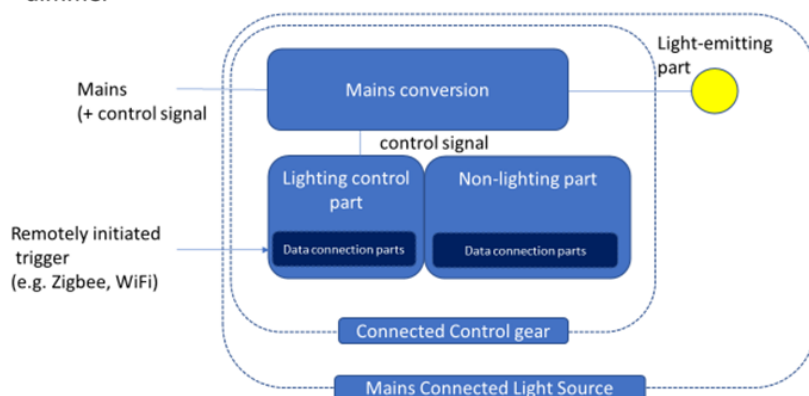
"Architecture" of definitions. Example of LED non mains light source

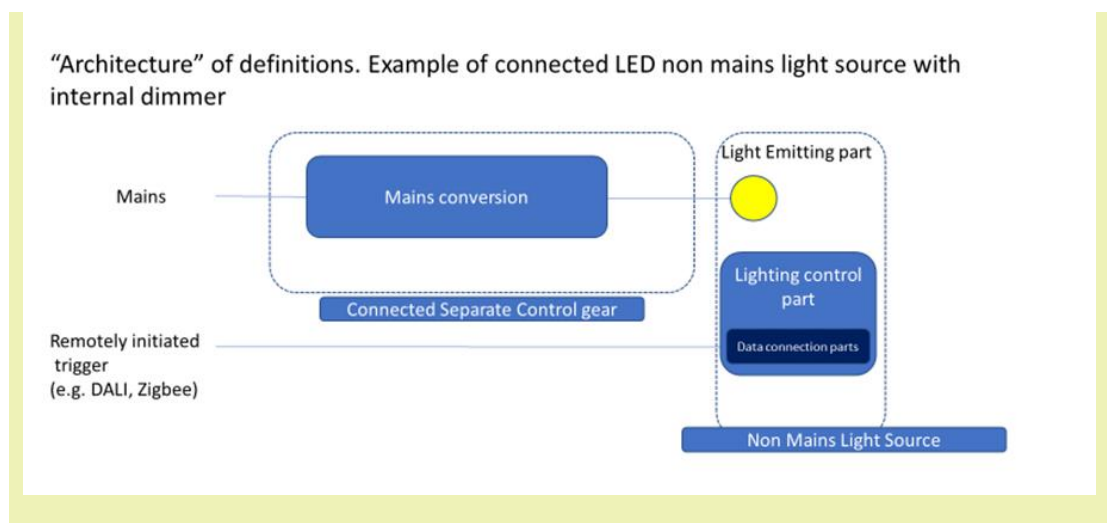


3. 'directional light source' (DLS) means a light source having at least 80 % of total luminous flux within a solid angle of π sr (corresponding to a cone with angle of 120°);
4. 'non-directional light source' (NDLS) means a light source that is not a directional light source;
5. 'connected light source' (CLS) means a light source including data-connection parts that are physically or functionally inseparable from the light emitting parts to maintain the 'reference control settings'. The light source can have physically integrated data-connection parts in a single inseparable housing, or the light source can be combined with physically separate data-connection parts placed on the market together with the light source as a single product;

LightingEurope comment:

"Architecture" of definitions. Example of LED mains connected light source with internal dimmer



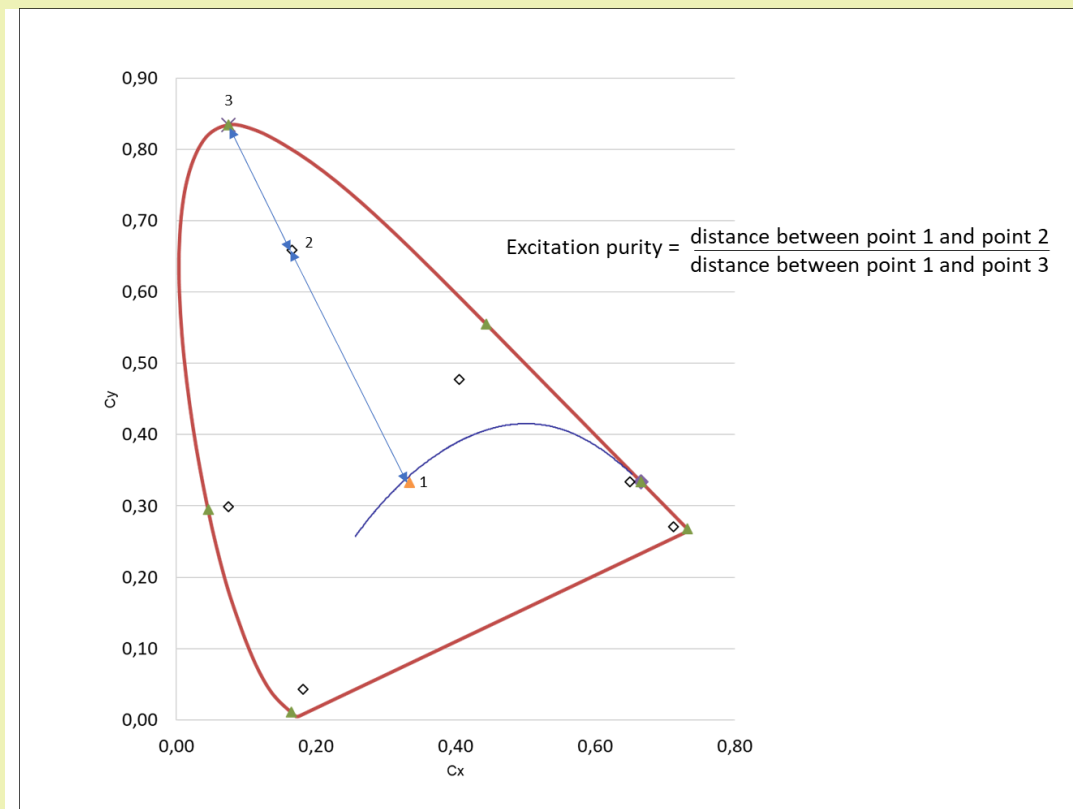


6. 'connected separate control gear' (CSCG) means a separate control gear including data-connection parts that are physically or functionally inseparable from the actual control gear parts to maintain the 'reference control settings'. The separate control gear can have physically integrated data-connection parts in a single inseparable housing, or the separate control gear can be combined with physically separate data-connection parts placed on the market together with the control gear as a single product;
7. 'data-connection parts' means parts that perform any one of the following functions:
 - a. reception or transmission of wired or wireless data signals and the processing thereof (used to control the light emission function and possibly otherwise);
 - b. sensing and processing of the sensed signals (used to control the light emission function and possibly otherwise);
 - c. a combination of these;
8. 'colour-tuneable light source' (CTLTS) means a light source that can be set to emit light with a large variety of colours outside the range defined in Article 2 but can also be set to emit white light inside the range defined in Article 2 for which the light source is within the scope of this Regulation. Tuneable-white light sources that can only be set to emit light, with different correlated colour temperatures, within the range defined in Article 2, and dim- to-warm light sources that shift their white light output to lower correlated colour temperature when dimmed, simulating the behaviour of incandescent light sources, are not considered CTLTS;
9. 'excitation purity' means a percentage computed for a CTLTS set to emit light of a certain colour, using a procedure further defined in standards, by drawing a straight line on an (x and y) colour space graph from a point with colour coordinates $x=0,333$ and $y=0,333$ (achromatic stimulus point), going through the point representing the (x and y) colour coordinates of the light source (point 2), and ending on the outer

border of the colour space (locus; point 3). The excitation purity is computed as the distance between points 1 and 2 divided by the distance between points 1 and 3. The full length of the line represents 100 % colour purity (point on the locus). The achromatic stimulus point represents 0 % colour purity (white light);

LightingEurope comment:

Diagram 3: Excitation purity index



10. 'high-luminance light source' (HLLS) means a LED light source with an average luminance greater than 30 cd/mm² in the direction of peak intensity;

LightingEurope comment:

An explanation is given under point (12), below.

11. 'luminance' (in a given direction, at a given point of a real or imaginary surface) means the luminous flux transmitted by an elementary beam passing through the given point and propagating in the solid angle containing the given direction divided by the area of a section of that beam containing the given point (cd/m²);

LightingEurope comment:

Both cd/m^2 and cd/mm^2 are in line with their respective definitions in this Annex.

12. 'average luminance' (Luminance-HLLS) for a LED light source means the average luminance over a light-emitting area where the luminance is more than 50 % of the peak luminance (cd/mm^2);

LightingEurope comment:

Average luminance may be measured using any calibrated luminance measurement device that has the capability to resolve a light-emitting area where the luminance is more than 50 % of the peak luminance. This may be a luminance meter with a small enough aperture or a luminance camera. The average may be taken over any area or line where the luminance is more than 50 % of the peak luminance. In the case of a luminance camera, the area should be large enough to minimise camera noise. Errors caused by colour calibration in sources with near-field colour variation may be neglected for the sake of simplicity.

Average luminance can also be derived from measurements in accordance with photometric standards (e.g., intensity readings with projected area according to EN 13032).

For light sources comprising multiple discrete emitters, the average luminance measurement may be applied to any single emitter so long as the emitters are identical. If there are different emitter types, such as in a CTLS, the measurement is understood to apply to the emitter type with the highest or closest to the highest luminance and that substantially contributes to the total flux when operated at the reference control settings.

13. 'lighting control parts' means parts that are integrated in a light source or in a separate control gear, or physically separated but marketed together with a light source or separate control gear as a single product, that are not strictly necessary for the light source to emit light at full-load, or for the separate control gear to supply the electric power that enables light source(s) to emit light at full-load, but that enable manual- or automatic-, direct- or remote-, control of luminous intensity, chromaticity, correlated colour temperature, light spectrum and/or beam angle. Dimmers shall also be considered as lighting control parts.

The term also includes data-connection parts, but the term does not include products within the scope of Commission Regulation (EC) No 1275/2008;

LightingEurope comment:

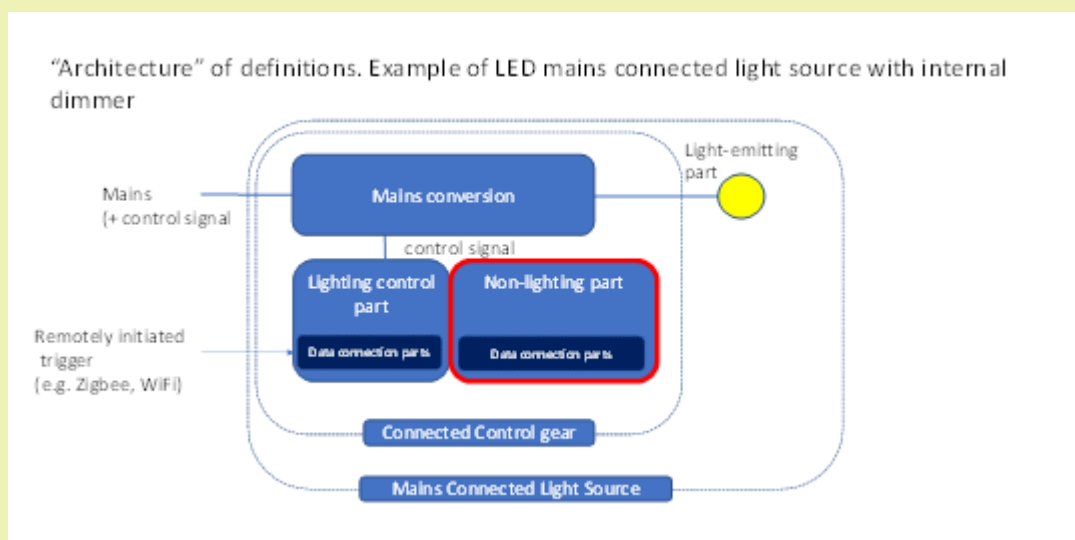
Examples include, but are not limited to, such devices as presence detectors, daylight sensors, and communication interfaces (which allow the luminaire to be controlled remotely either manually or automatically).

14. 'non-lighting parts' means parts that are integrated in a light source, or in a separate control gear, or physically separated but marketed together with a light source or separate control gear as a single product, that are not necessary for the light source to emit light at full-load, or for the separate control gear to supply the electric power that enables light source(s) to emit light at full-load, and that are not lighting control parts. Examples include, but are not limited to: speakers (audio), cameras, repeaters for communication signals to extend the range (e.g. WiFi), parts supporting grid balance (switching to own internal batteries when necessary), battery charging, visual notification of events (mail arriving, door bell ringing, alert), use of Light Fidelity (Li-Fi, a bidirectional, high-speed and fully networked wireless communication technology).

The term also includes data-connection parts used for other functions than to control the light emission function;

LightingEurope comment:

Illustration of non-lighting parts (within red box).



15. 'useful luminous flux' (Φ_{use}), means the part of the luminous flux of a light source that is considered when determining its energy efficiency:
- for non-directional light sources it is the total flux emitted in a solid angle of 4π

sr (corresponding to a 360° sphere);

- for directional light sources with beam angle $\geq 90^\circ$ it is the flux emitted in a solid angle of π sr (corresponding to a cone with angle of 120°);
- for directional light sources with beam angle $< 90^\circ$ it is the flux emitted in a solid angle of 0.586π sr (corresponding to a cone with angle of 90°);

16. 'beam angle' of a directional light source means the angle between two imaginary lines in a plane through the optical beam axis, such that these lines pass through the centre of the front face of the light source and through points at which the luminous intensity is 50 % of the centre beam intensity, where the centre beam intensity is the value of luminous intensity measured on the optical beam axis.

For light sources that have different beam angles in different planes, the largest beam angle shall be the one taken into account.

For light sources with user-controllable beam angle, the beam angle corresponding to the 'reference control setting' shall be the one taken into account;

17. 'full-load' means:

- the condition of a light source, within the declared operating conditions, in which it emits the maximum (undimmed) luminous flux; or
- the operating conditions and loads of the control gear under efficiency measurement as specified in the relevant standards;

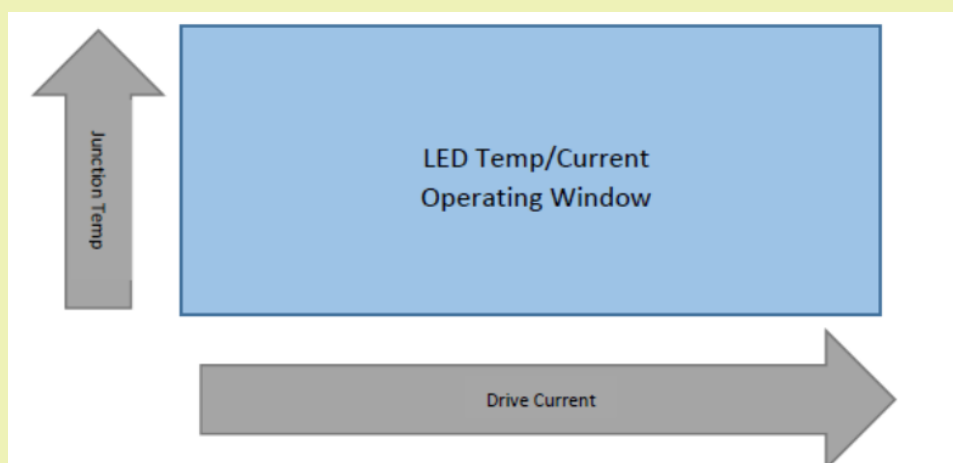
LightingEurope comment:

When reading the definition of 'full-load,' keep in mind the description of 'reference control settings (RCS)' under point (29) of this Article.

Non-mains supplied LED light sources may often have a very wide range of possible operating conditions (e.g., drive current; tp temperature; CCT) under which they can operate. The limits of these characteristics may also vary depending upon the specific lifetime claims being made for the source (e.g., expected operating hours, lumen maintenance, colour stability).

The regulation does not specify that the nominal test conditions defined by the non-mains LED light source supplier need to be identical to the actual operating conditions in the containing product. This could result in a situation in which the declared values (e.g., flux, lifetime) and the energy efficiency class declared by the light source supplier is not representative for the actual use of the light source in the containing product.

Figure 2: LED temperature / current operating window



Independent of its operating conditions in the containing product, when a light source is removed for verification, the light source has to fulfil the light source requirements of this regulation.

LightingEurope has requested the European Commission to provide further guidance on the terms 'full-load,' 'reference control settings,' and nominal test conditions. A next update of these guidelines may contain the clarity provided to answer this concern.

These comments are also relevant for Annex I(29).

18. 'no-load mode' means the condition of a separate control gear in which its input is connected to the mains power source and its output is intentionally disconnected from light sources, and, if applicable, from lighting control parts and non-lighting parts. If these parts cannot be disconnected, they shall be switched off and their power consumption shall be minimised following the manufacturer's instructions. No-load mode only applies to a separate control gear for which the manufacturer or importer has declared in the technical documentation that it has been designed for this mode;
19. 'standby mode' means the condition of a light source or of a separate control gear, where it is connected to the power supply but the light source is intentionally not emitting light, and the light source or control gear is awaiting a control signal to return to a state with light emission. Lighting control parts enabling the standby function shall be in their control mode. Non-lighting parts shall be disconnected or switched off or their power consumption shall be minimised following manufacturer's instructions;
20. 'networked standby mode' means the condition of a CLS or a CSCG where it is connected to the power supply but the light source is intentionally not emitting light or the control gear does not supply the electric power that enables light source(s) to emit light, and is awaiting a remotely initiated trigger to return to a state with

light emission. Lighting control parts shall be in their control mode. Non-lighting parts shall be disconnected or switched off or their power consumption shall be minimised following manufacturer's instructions;

21. 'control mode' means the condition of lighting control parts where they are connected to the light source and/or to the separate control gear and performing their functions in such a way that a control signal can be internally generated or a remotely initiated trigger can be received, by wire or wireless, and processed to lead to a change in the light emission of the light source or to a corresponding desired change in the power supply by the separate control gear;
22. 'remotely initiated trigger' means a signal that comes from outside the light source or separate control gear via a network;

LightingEurope comment:

DALI or Zigbee communication networks are examples of remotely initiated triggers. See LightingEurope examples above.

23. 'control signal' means an analogue or digital signal transmitted to the light source or separate control gear wirelessly or wired either via voltage modulation in separate control cables or via a modulated signal in the supply voltage. The signal transmission is not through a network but e.g. from an internal source or from a remote control delivered with the product;
24. 'network' means a communication infrastructure with a topology of links, an architecture, including the physical components, organisational principles, communication procedures and formats (protocols);
25. 'on-mode power' (P_{on}), expressed in watt, means the electric power consumption of a light source in full-load with all lighting control parts and non-lighting parts disconnected. If these parts cannot be disconnected, they shall be switched off or their power consumption shall be minimised following the manufacturer's instructions. In case of a NMLS that requires a separate control gear to operate, P_{on} can be measured directly on the input to the light source, or P_{on} is determined using a control gear with known efficiency, whose electric power consumption is subsequently subtracted from the measured mains power input value;
26. 'no-load power' (P_{no}), expressed in watt, is the electric power consumption of a separate control gear in no-load mode;
27. 'standby power' (P_{sb}), expressed in watt, is the electric power consumption of a light source or of a separate control gear in standby mode;
28. 'networked standby power' (P_{net}), expressed in watt, is the electric power

consumption of a CLS or of a CSCG in networked standby mode;

29. 'reference control settings' (RCS) means a control setting or a combination of control settings that is used to verify compliance of a light source with this Regulation. These settings are relevant for light sources that allow the end- user to control, manually or automatically, directly or remotely, the luminous intensity, colour, correlated colour temperature, spectrum, and/or beam angle of the emitted light.

In principle, the reference control settings shall be those predefined by the manufacturer as factory default values and encountered by the user at first installation (out-of-the-box values). If the installation procedure provides for an automatic software update during first installation, or if the user has the option to perform such an update, the resulting change in settings (if any) shall be taken into account.

If the out-of-the-box value is deliberately set differently from the reference control setting (e.g. at low power for safety purposes), the manufacturer shall indicate in the technical documentation how to recall the reference control settings for compliance verification and provide a technical justification why the out-of-the-box value is set different from the reference control setting.

The light source manufacturer shall define the reference control settings such that:

- the light source is within the scope of this Regulation according to Article 1 and none of the conditions for exemption applies;
- lighting control parts and non-lighting parts are disconnected or switched- off or, in case this is not possible, the power consumption of these parts is minimal;
- the full-load condition is obtained;
- when the end-user opts to reset factory defaults, the reference control settings are obtained.

For light sources that allow the manufacturer of a containing product to make implementation choices that influence light source characteristics (e.g. definition of the operating current(s); thermal design), and that cannot be controlled by the end-user, the reference control settings need not be defined. In that case the nominal test conditions as defined by the light source manufacturer apply;

LightingEurope comment:

The reference control settings are not necessarily the maximum allowed values, and the settings are provided by the manufacturer in the full dataset.

See also our comments to Annex I(17).

- 30. 'high-pressure mercury light source' means a high intensity discharge light source in which the major portion of light is produced, directly or indirectly, by radiation from predominantly vaporised mercury operating at a partial pressure in excess of 100 kilopascals;
- 31. 'metal halide light source' (MH) means a high intensity discharge light source 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. MH light sources may have one ('single-ended') or two ('double-ended') connectors to their electricity supply. The material for the arc tube of MH light sources can be quartz (QMH) or ceramic (CMH);
- 32. 'compact fluorescent light source' (CFL) means a single-capped fluorescent light source with a bent-tube construction designed to fit in small spaces. CFLs may be primarily spiral-shaped (i.e. curly forms) or primarily shaped as connected multiple parallel tubes, with or without a second bulb-like envelope. CFLs are available with (CFLi) or without (CFLni) a physically integrated control gear;
- 33. 'T2', 'T5', 'T8', 'T9' and 'T12' means a tubular light source with a diameter of approximately 7, 16, 26, 29 and 38 mm respectively, as defined in standards. The tube can be straight (linear) or bent (e.g. U-shaped, circular);
- 34. 'LFL T5-HE' means a high-efficiency linear fluorescent T5 light source with driving current lower than 0,2 A;
- 35. 'LFL T5-HO' means a high-output linear fluorescent T5 light source with driving current higher than or equal to 0,2 A;
- 36. 'LFL T8 2-foot', 'LFL T8 4-foot' or 'LFL T8 5-foot' means a linear T8 fluorescent light source with a length of approximately 600 mm (2 feet), 1200 mm (4 feet) or 1500 mm (5 feet) respectively, as defined in standards;
- 37. 'magnetic induction light source' means a light source using fluorescent technology, where energy is transferred to the gas discharge by means of an induced high-frequency magnetic field, instead of using electrodes placed inside the gas discharge. The magnetic inductor can be external or internal to the shape of the discharge tube;
- 38. 'G4', 'GY6.35' and 'G9' means an electrical interface of a light source consisting of two small pins at distances of 4, 6,35 and 9 mm respectively, as defined in standards;
- 39. 'HL R7s' means a mains-voltage, double-capped, linear halogen light source with a cap diameter of 7 mm;
- 40. 'K39d' means an electrical interface for a light source consisting of 2 wires with eyelets that can be fixed with screws;

41. 'G9.5', 'GX9.5', 'GY9.5', 'GZ9.5', 'GZX9.5', 'GZY9.5', 'GZZ9.5' 'G9.5HPL', 'G16', 'G16d', 'GX16d', 'GY16', 'G22', 'G38', 'GX38' and 'GX38Q' means an electrical interface of a light source consisting of two pins at distances of 9,5, 16, 22 and 38 mm respectively, as defined in standards. 'G9.5HPL' includes a heatsink of specific dimensions as used on high-performance halogen lamps, and may include additional pins for grounding purposes;
42. 'P28s', 'P40s', 'PGJX28', 'PGJX36' and 'PGJX50' means an electrical interface of a light source that uses a flange contact to correctly position (pre-focus) the light source in a reflector, as defined in standards;
43. 'QXL (Quick eXchange Lamp)' means an electrical interface of a light source consisting, on the light source side, of two lateral tabs including the electrical contact surfaces and, on the opposite (rear) side, of a central protrusion allowing the light source to be grabbed with two fingers. It is specifically designed for use in a specific type of stage lighting luminaires, in which the light source is inserted from the rear of the luminaire using a one quarter turn rotation to fix or unfix it;
44. 'battery-operated' means a product that operates only on direct current (DC) supplied from a source contained in the same product, without being connected directly or indirectly to the mains electricity supply;
45. 'second envelope' means a second outer envelope on an HID light source that 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 envelope, the HID arc tubes shall not count as an envelope;
46. 'non-clear envelope' for an HID light source means a non-transparent outer envelope or outer tube in which the light producing arc tube is not visible;
47. 'anti-glare shield' means a mechanical or optical reflective or non-reflective impervious baffle designed to block direct visible radiation emitted from the light emitter in a directional light source, in order to avoid temporary partial blindness (disability glare) if viewed directly by an observer. It does not include surface coating of the light emitter in the directional light source;
48. 'control gear efficiency' means the output power that supplies a light source divided by the input power of a separate control gear using the conditions and methods defined in standards. Any lighting control parts and non-lighting parts are disconnected, switched off or set to minimum power consumption according to manufacturer's instructions and subtracting this power consumption from the overall input power;
49. 'functionality after endurance testing' means the functionality of a LED or OLED light source after endurance testing as defined in Annex V;

50. 'flicker' means the perception of visual unsteadiness induced by a light stimulus, the luminance or spectral distribution of which fluctuates with time, for a static observer in a static environment. The fluctuations can be periodic and non-periodic and may be induced by the light source itself, the power source or other influencing factors.

The metric for flicker used in this Regulation is the parameter ' P_{st}^{LM} ', where 'st' stands for short term and 'LM' for light flickermeter method, as defined in standards. A value $P_{st}^{LM}=1$ means that the average observer has a 50 % probability of detecting flicker;

51. 'stroboscopic effect' means a change in motion perception induced by a light stimulus, the luminance or spectral distribution of which fluctuates with time, for a static observer in a non-static environment. The fluctuations can be periodic and non-periodic and may be induced by the light source itself, the power source or other influencing factors.

The metric for the stroboscopic effect used in this Regulation is the 'SVM' (stroboscopic visibility measure), as defined in standards. $SVM = 1$ represents the visibility threshold for an average observer;

52. 'declared value' means the value provided by the manufacturer, importer or authorised representative for the stated, calculated or measured technical parameters in accordance with Article 5, for the verification of compliance by the Member State authorities;

LightingEurope comment:

The term declared value is used instead of the terms 'nominal' and 'rated values' in the previous regulations.

Annex IV.2 to Directive 2009/125/EC

A Technical Documentation File making possible an assessment of the conformity of the product with the requirements of the applicable implementing measure must be compiled by the manufacturer.

The documentation must contain, in particular:

- a. a general description of the product and of its intended use;
- b. the results of relevant environmental assessment studies carried out by the manufacturer, and/or references to environmental assessment literature or case studies, which are used by the manufacturer in evaluating, documenting and determining product design solutions;
- c. the ecological profile, where required by the implementing measure;

- d. elements of the product design specification relating to environmental design aspects of the product;
- e. a list of the appropriate standards referred to in Article 10, applied in full or in part, and a description of the solutions adopted to meet the requirements of the applicable implementing measure where the standards referred to in Article 10 have not been applied or where those standards do not cover entirely the requirements of the applicable implementing measure;
- f. a copy of the information concerning the environmental design aspects of the product provided in accordance with the requirements specified in annex I, Part 2; and
- g. the results of measurements on the ecodesign requirements carried out, including details of the conformity of these measurements as compared with the ecodesign requirements set out in the applicable implementing measure.

Definitions as in the legislation

Measured value: although the Regulation does not specifically define measured values, it does require a measurement using reliable, accurate and reproducible methods. These methods should consider recognised, state-of-the-art measurement methods, as listed Annex I of Regulation (EU) No 1025/2012 (see Preamble, Para. 16).

Declared value: the value given by the manufacturer or importer in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (see Annex I, Point 51).

Determined value: the arithmetic mean over the tested units of the measured values for a given parameter or the arithmetic mean of parameter values calculated from measured values (see Annex IV, Point 2(c)).

- 53. 'specific effective radiant ultraviolet power' (mW/klm) means the effective power of the ultraviolet radiation of a light source weighted according to the spectral correction factors and related to its luminous flux;
- 54. 'luminous intensity' (candela or cd) means the quotient of the luminous flux leaving the source and propagated in the element of solid angle containing a given direction, by the element of solid angle;
- 55. 'correlated colour temperature' (CCT [K]) means the 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;
- 56. 'colour consistency' means the maximum deviation of the initial (after a short period of time), spatially averaged chromaticity coordinates (x and y) of a single

light source from the chromaticity centre point (cx and cy) declared by the manufacturer or the importer, expressed as the size (in steps) of the MacAdam ellipse formed around the chromaticity centre point (cx and cy);

57. 'displacement factor ($\cos \varphi_1$)' means the cosine of the phase angle φ_1 between the fundamental harmonic of the mains supply voltage and the fundamental harmonic of the mains current. It is used for mains light sources using LED- or OLED-technology. The displacement factor is measured at full-load, for the reference control settings where applicable, with any lighting control parts in control mode and non-lighting parts disconnected, switched off or set to minimum power consumption according to the manufacturer's instructions;

LightingEurope comment:

The metric power factor (λ) is a composite metric and consists of the primary metric's displacement factor ($\kappa_{\text{displacement}}$) and distortion factor ($\kappa_{\text{distortion}}$). Please note that this regulation does not continue with the past practices of setting requirements on the entire power factor, but only sets requirements for the displacement factor.

The relation between the composite metric λ and its primary metric's $\kappa_{\text{displacement}}$ and $\kappa_{\text{distortion}}$ is as follows:

$$\lambda = \kappa_{\text{displacement}} \cdot \kappa_{\text{distortion}}$$

With

$$\kappa_{\text{displacement}} = \cos \varphi_1$$

And

$$\kappa_{\text{distortion}} = \frac{1}{\sqrt{1 + THD^2}}$$

Resulting in

$$\lambda = \frac{\cos \varphi_1}{\sqrt{1 + THD^2}}$$

Angle φ_1 is the phase angle between the fundamental of the supply voltage and the fundamental of the mains current. The total harmonic distortion (thd) is quantified by the harmonics of the mains current, according to IEC 61000-3-2. The relation between the individual harmonics of the mains current and the thd is in the equation below:

$$THD = \sqrt{\sum_{n=2}^{40} \left(\frac{I_n}{I_1} \right)^2}$$

Where I_n is the amplitude of the n^{th} harmonic of the mains current.

- 58. 'lumen maintenance factor' (X_{LMF}) means the ratio of the luminous flux emitted by a light source at a given time in its life to the initial luminous flux;
- 59. 'survival factor' (SF) means the defined fraction of the total number of light sources that continue to operate at a given time under defined conditions and switching frequency;
- 60. 'lifetime' for LED and OLED light sources means the time in hours between the start of their use and the moment when for 50 % of a population of light sources the light output has gradually degraded to a value below 70 % of the initial luminous flux. This is also referred to as the $L_{70}B_{50}$ lifetime;
- 61. 'photosensitive patients' means people with a specific condition causing photosensitive symptoms and who experience adverse reactions to natural and/ or certain forms of artificial lighting technology;
- 62. 'projected light-emitting surface area (A)' is the surface area in mm^2 (square millimetres) of the view in an orthographic projection of the light-emitting surface from the direction with the highest light intensity, where the light-emitting surface area is the surface area of the light source that emits light with the declared optical characteristics, such as the approximately spherical surface of an arc (a), cylindrical surface of a filament coil (b) or a gas discharge lamp (c, d), flat or semi-spherical envelope of a light-emitting diode (e).

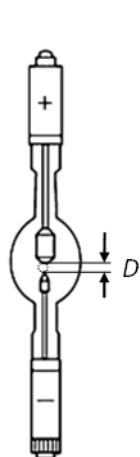
For light sources with a non-clear envelope or with anti-glare shield, the light-emitting surface area is the entire area through which light leaves the light source.

For light sources containing more than one light emitter, the projection of the smallest gross volume enveloping all emitters shall be taken as the light-emitting surface.

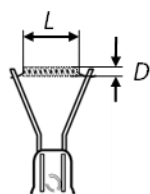
For HID light sources definition (a) applies, unless the dimensions defined in (d) apply with $L > D$, where L is the distance between the electrode tips and D the inner diameter of the arc tube.

LightingEurope comment:

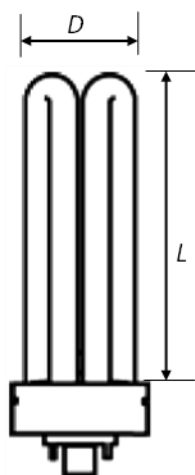
The examples given in this definition have little practical relevance. The definition is used solely to exclude light sources with $>500 \text{ lm/mm}^2$ from the scope (in Article 2(1)(b)). For LED-based light sources, many designs, including those with high luminous emittance, do not have a semi-spherical envelope. However, the projected light-emitting surface can be determined according to the general definition.



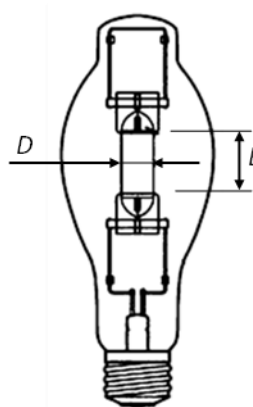
(a)
 $A = \frac{1}{4}\pi D^2$



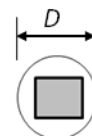
(b)
 $A = L \cdot D$



(c)
 $A = L \cdot D$



(d)
 $A = L \cdot D$



(e)
 $A = \frac{1}{4}\pi D^2$

Annex II: Ecodesign requirements

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published for this purpose in the Official Journal of the European Union, or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art.

1. Energy efficiency requirements:

- a. From 1 September 2021, the declared power consumption of a light source P_{on} shall not exceed the maximum allowed power P_{onmax} (in W), defined as a function of the declared useful luminous flux Φ_{use} (in lm) and the declared colour rendering index CRI (-) as follows:

$$P_{onmax} = C \times (L + \Phi_{use} / (F \times \eta)) \times R;$$

where:

- The values for threshold efficacy (η in lm/W) and end loss factor (L in W) are specified in Table 1, depending on the light source type. They are constants used for computations and do not reflect true parameters of light sources. The threshold efficacy is not the minimum required efficacy; the latter can be computed by dividing the useful luminous flux by the computed maximum allowed power.
- Basic values for correction factor (C) depending on light source type, and additions to C for special light source features are specified in Table 2.
- Efficacy factor (F) is:
 - 1,00 for non-directional light sources (NDLS, using total flux)
 - 0,85 for directional light sources (DLS, using flux in a cone)
- CRI factor (R) is:
 - 0,65 for CRI $\leq$ 25;
 - (CRI+80)/160 for CRI > 25, rounded to two decimals.

LightingEurope comment:

The maximum requirement on declared power consumption (P_{onmax}) can also be expressed as a minimum requirement on luminous efficacy (η_{onmin}).

$$\eta_{onmin} = \Phi_{use} / P_{onmax} = \Phi_{use} / (C \times (L + \Phi_{use} / (F \times \eta)) \times R)$$

Light sources with higher luminous flux must meet higher requirements on luminous efficacy, as illustrated in Figure 3. In addition to flux, the efficacy requirement also

depends on the other parameters provided in the equation (C, L, F, η and R).

For example, for a non-directional LED light source not operating on mains with a luminous flux of 2000 lm and CRI of 90, the following parameter values are used: C = 1, L = 1,5 W, F = 1, η = 120 lm/W and R = 1,0625. For this light source, the maximum declared power consumption is 19,3 W and the minimum luminous efficacy is 104 lm/W. For this light source, the maximum declared power consumption is:

$$P_{onmax} = 1 \times (1,5 \text{ W} + 2000 \text{ lm} / (1 \times 120 \text{ lm/W})) \times 1,0625 = 19,3 \text{ W}$$

And the minimum luminous efficacy is:

$$\eta_{onmin} = 2000 \text{ lm} / (1 \times (1,5 \text{ W} + 2000 \text{ lm} / (1 \times 120 \text{ lm/W})) \times 1,0625) = 104 \text{ lm/W.}$$

Figure 3: Luminous efficacy level for non-directional and non-mains light sources

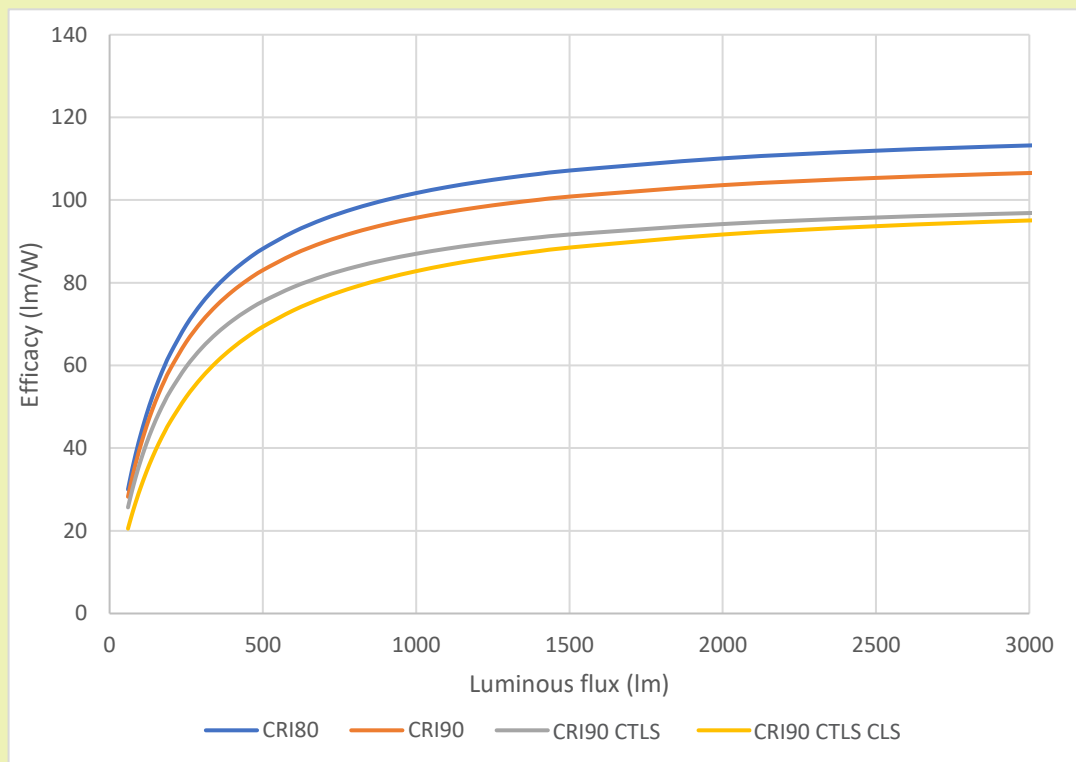


Table 1 – Threshold efficacy (η) and end loss factor (L)

Light source description	η [lm/W]	L [W]
LFL T5-HE	98,8	1,9
LFL T5-HO, $4000 \leq \Phi \leq 5000$ lm	83,0	1,9
LFL T5-HO, other lm output	79,0	1,9
FL T5 circular	79,0	1,9
FL T8 (including FL T8 U-shaped)	89,7	4,5
From 1 September 2023, for FL T8 of 2-, 4- and 5-foot	120,0	1,5
Magnetic induction light source, any length/flux	70,2	2,3
CFLni	70,2	2,3

FL T9 circular	71,5	6,2
HPS single-ended	88,0	50,0
HPS double-ended	78,0	47,7
MH $\leq$ 405 W single-ended	84,5	7,7
MH $>$ 405 W single-ended	79,3	12,3
MH ceramic double-ended	84,5	7,7
MH quartz double-ended	79,3	12,3
Organic light-emitting diode (OLED)	65,0	1,5
Until 1 September 2023: HL G9, G4 and GY6.35	19,5	7,7
HL R7s $\leq$ 2700 lm	26,0	13,0
Other light sources in scope not mentioned above	120,0	1,5*

* For connected light sources (CLS) a factor $L=2,0$ shall be applied

LightingEurope comment:

For many light sources (most fluorescents, HPS, and MHs), the above requirements correspond to the requirements of Regulations 244/2009, 245/2009, and 1194/2012, meaning the efficiency limit remains the same (by using a different formula) and are not phased out.

Some specific light sources (T8 linear fluorescent 2-, 4-, and 5-foot length lamps, and halogen lamps with a G4, G9, or GY6.35 base) have their own category and are not phased out until 1 September 2023.

However, most halogen lamps and CFLi lamps fall into the "other light sources not mentioned above" category, effectively phasing these lamps out as of 1 September 2021. Linear halogen R7s $\leq$ 2700 lm have their own category and, if they meet the requirements, are not phased out.

Table 2 – Correction factor C depending on light source characteristics

Light source type	Basic C value
Non-directional (NDLS) not operating on mains (NMLS)	1,00
Non-directional (NDLS) operating on mains (MLS)	1,08
Directional (DLS) not operating on mains (NMLS)	1,15
Directional (DLS) operating on mains (MLS)	1,23
Special light source feature	Bonus on C
FL or HID with CCT >5000 K	+0,10
FL with CRI > 90	+0,10
HID with second envelope	+0,10

MH NDLS >405 W with non-clear envelope	+0,10
DLS with anti-glare shield	+0,20
Colour-tuneable light source (CTLS)	+0,10
High luminance light sources (HLLS)	+ 0,0058 x Luminance-HLLS - 0,0167

Where applicable, bonuses on correction factor C are cumulative.

The bonus for HLLS shall not be combined with the basic C-value for DLS (basic C-value for NDLS shall be used for HLLS).

Light sources that allow the end-user to adapt the spectrum and/or the beam angle of the emitted light, thus changing the values for useful luminous flux, colour rendering index (CRI) and/or correlated colour temperature (CCT), and/or changing the directional/non-directional status of the light source, shall be evaluated using the reference control settings.

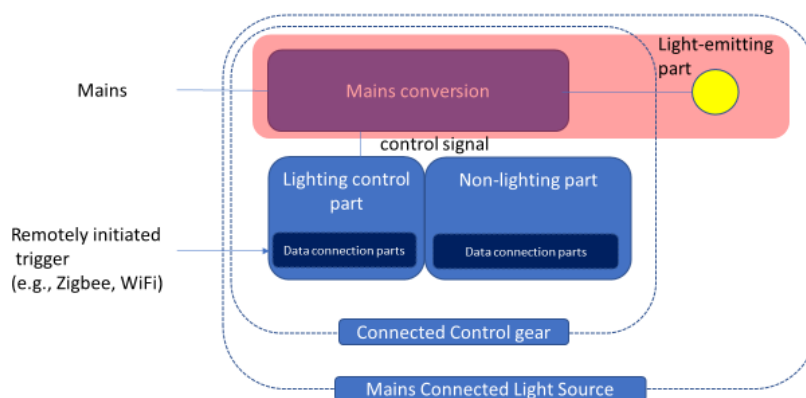
The standby power P_{sb} of a light source shall not exceed 0,5 W.

The networked standby power P_{net} of a connected light source shall not exceed 0,5 W.

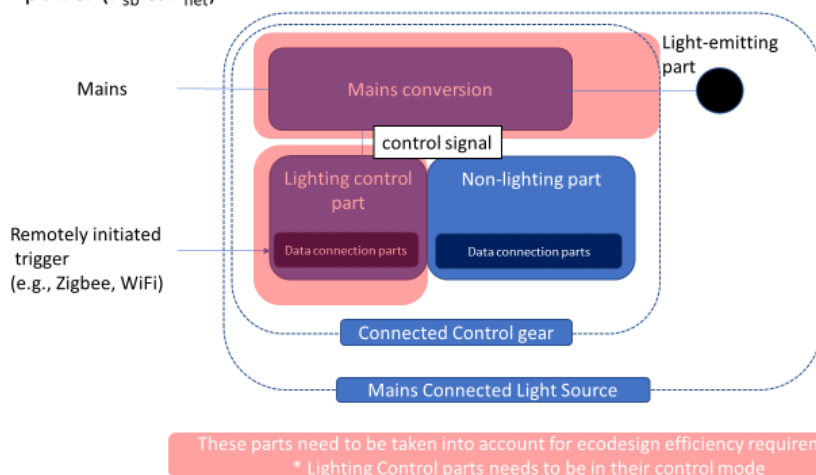
The allowable values for P_{sb} and P_{net} shall not be added together.

LightingEurope comment:

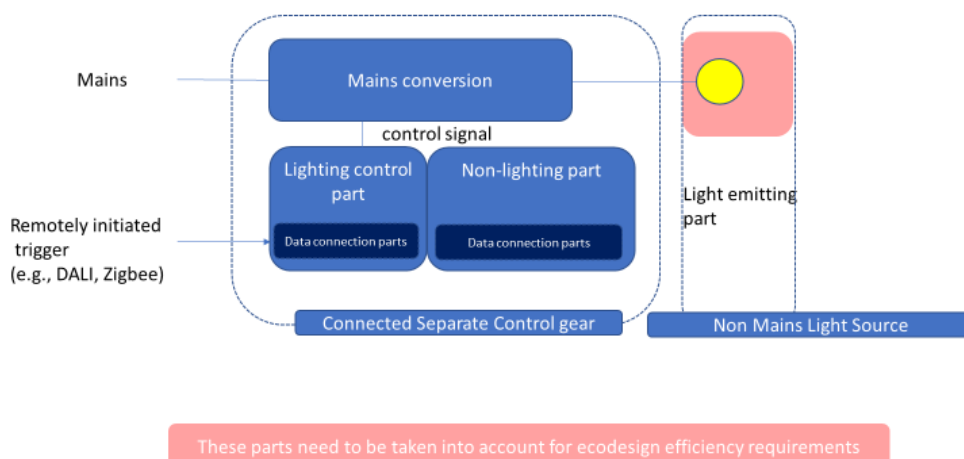
Energy efficiency requirements for LED mains connected light source: on-mode power (P_{on})



Energy requirements for LED mains connected light source: (networked) standby mode power (P_{sb} & P_{net})



Energy efficiency requirements for LED non mains light source "on-mode power (P_{on})"



- b. From 1 September 2021, the values set in Table 3 for the minimum energy efficiency requirements of a separate control gear operating at full-load shall apply:

Table 3 – Minimum energy efficiency for separate control gear at full-load

Declared output power of the control gear (P_{cg}) or declared power of the light source (P_{ls}) in W, as applicable	Minimum energy efficiency
Control gear for HL light sources	
All wattages P_{cg}	0,91
Control gear for FL light sources	
$P_{ls} \leq 5$	0,71
$5 < P_{ls} \leq 100$	$P_{ls} / (2 \times \sqrt{(P_{ls} / 36)} + 38 / 36 \times P_{ls} + 1)$
$100 < P_{ls}$	0,91

Control gear for HID light sources	
$P_{ls} \leq 30$	0,78
$30 < P_{ls} \leq 75$	0,85
$75 < P_{ls} \leq 105$	0,87
$105 < P_{ls} \leq 405$	0,90
$405 < P_{ls}$	0,92
Control gear for LED or OLED light sources	
all wattages P_{cg}	$P_{cg}^{0,81} / (1,09 \times P_{cg}^{0,81} + 2,10)$

LightingEurope comment:

The acronym 'HL' in Table 3 refers to halogen light sources and should not be confused with high-luminance light sources (HLLS).

Multi-wattage separate control gears shall comply with the requirements in Table 3 according to the maximum declared power on which they can operate.

The no-load power P_{no} of a separate control gear shall not exceed 0,5 W. This applies only to separate control gear for which the manufacturer or importer has declared in the technical documentation that it has been designed for no-load mode.

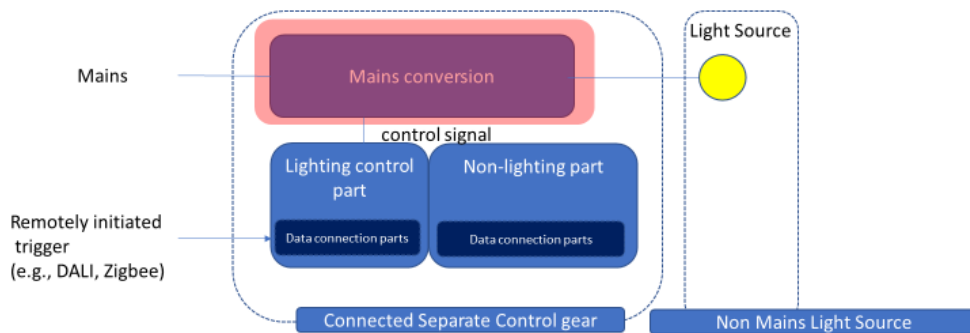
The standby power P_{sb} of a separate control gear shall not exceed 0,5 W.

The networked standby power P_{net} of a connected separate control gear shall not exceed 0,5 W. The allowable values for P_{sb} and P_{net} shall not be added together.

LightingEurope comment:

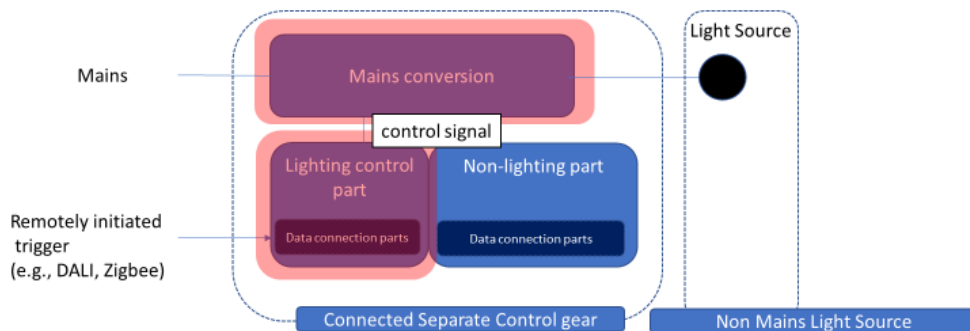
Table 3 provides the minimum energy efficiency requirements that will be applied as of 1 September 2021, dependant on the type of control gear and declared output power of the control gear. The subsequent text defines how multi-wattage control gear should be treated and provides the maximum allowed power consumption that will apply to control gear in no-load and standby conditions. It also defines the maximum networked standby power allowed and states that allowable standby and networked power shall not be added together.

Energy efficiency requirements for separate LED control gear



These parts need to be taken into account for ecodesign efficiency requirements

Energy requirements for separate LED control gear: (networked) standby mode power (P_{sb} & P_{net})



These parts need to be taken into account for ecodesign efficiency requirements
* Lighting Control parts needs to be in their control mode

For light sources and control gears with a wired control interface (e.g., DALI), special consideration must be taken into account concerning the power that may flow from the control bus to or from the tested product. Please see standard IEC 63103.

2. Functional requirements

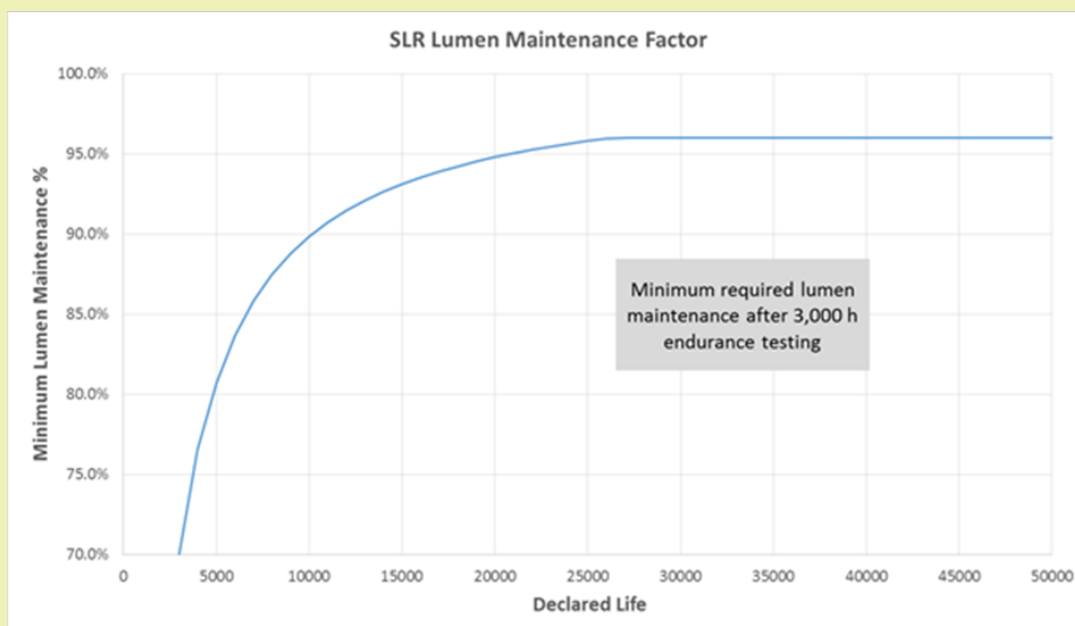
From 1 September 2021, the functional requirements specified in Table 4 shall apply for light sources:

Table 4 – Functional requirements for light sources

Colour rendering	CRI ≥ 80 (except for HID with $\Phi_{\text{use}} > 4 \text{ klm}$ and for light sources intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI < 80, when a clear indication to this effect is shown on the light source packaging and in all relevant printed and electronic documentation)
Displacement factor (DF, $\cos \Phi_1$) at power input P_{on} for LED and OLED MLS	No limit at $P_{\text{on}} \leq 5 \text{ W}$, DF ≥ 0,5 at $5 \text{ W} < P_{\text{on}} \leq 10 \text{ W}$, DF ≥ 0,7 at $10 \text{ W} < P_{\text{on}} \leq 25 \text{ W}$ DF ≥ 0,9 at $25 \text{ W} < P_{\text{on}}$
Lumen maintenance factor (for LED and OLED)	The lumen maintenance factor $X_{\text{LMF}}\%$ after endurance testing according to Annex V shall be at least $X_{\text{LMF,MIN}}\%$ calculated as follows: $X_{\text{LMF,MIN}} \% = 100 \times e^{\frac{(3\,000 \times \ln(0.7))}{L_{70}}}$ where L_{70} is the declared $L_{70}\text{B}_{50}$ lifetime (in hours) If the calculated value for $X_{\text{LMF,MIN}}$ exceeds 96,0 %, an $X_{\text{LMF,MIN}}$ value of 96,0 % shall be used

LightingEurope comment:

Figure 4: Lumen Maintenance Factor



The lumen maintenance requirement for LED and OLED found in Table 4 is simply a minimum requirement to be achieved after the 3000 hours (3600 hours total) endurance test (see Annex V). The required minimum lumen maintenance is based on the $L_{70}\text{B}_{50}$ declared life and is shown in the above graph (from the formula in Table 4).

As an example, a life claim of 10 000 hours results in a required minimum lumen maintenance of 89,9 %. For life claims above 26 000 hours, the minimum lumen maintenance requirement is 96,0 % after the endurance test. This, in practice, also covers products with life claims of 26 000 hours and greater based on higher I_x values (180, 190 etc.), as the requirement does not change above this level.

LED lifetimes based on characteristics better than $L_{70}B_{50}$ provided by the manufacturer (e.g., $L_{90}B_{50}$) are accepted without additional qualification (so long as the manufacturer complies with the required minimum lumen maintenance based on the $L_{70}B_{50}$ declared life). This is because the claimed lifetime will always be less than what would be achieved using the less onerous $L_{70}B_{50}$ rating. For example, the lumen maintenance requirement is set at >26 000 h on 96 %. This means when a manufacturer claims 99 %, the verification is still performed with a limit of 96 %.

Survival factor (for LED and OLED)	Light sources should be operational as specified in row "Survival factor (for LED and OLED)" of Annex IV, Table 6, following the endurance testing given in Annex V.
Colour consistency for LED and OLED light sources	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.

LightingEurope comment:

Because they differ from ANSI, colour points as mentioned in IEC documents are not mandatory. Since they are not mandatory, the manufacturer shall designate the central colour point (x,y coordinates) used, including the measurement method (e.g., ANSI, IEC), and publish these in the documentation and on the website.

For verification, the determined number of steps shall not exceed the declared number of steps. The average delta SCDM (MacAdam ellipses) from 10 light sources should be within 6 SDCM, and the centre of the MacAdam ellipse shall be the centre declared by the supplier with a tolerance 0,005 units.

Flicker for LED and OLED MLS	$P_{st}^{LM} \leq 1,0$ at full-load
------------------------------	-------------------------------------

LightingEurope comment:

The requirement is applicable to LED and OLED Mains Light Sources only. If a

containing product is considered a mains light source, it must comply. The test shall be carried out according to IEC TR 61547-1 with a stabilised 230 V ($\pm 0,5$ %) and with a frequency of 50 Hz ($\pm 0,5$ %) supply. For dimmable light sources, the test shall be carried out at full load. The light source being tested, along with the sensor, should be located in an optically shielded environment to avoid disturbances from other light sources.

Stroboscopic effect for LED and OLED MLS

SVM $\leq 0,9$ at full-load (except for light sources intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI < 80)

From 1 September 2024: SVM $\leq 0,4$ at full-load (except for light sources intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI < 80)

LightingEurope comment:

The requirement is applicable to LED and OLED Mains Light Sources and should not be applied to HID light sources. Confusion in the text has been communicated to the European Commission for further clarification. If a containing product is considered a Mains Light Source, it must comply. The test shall be carried out according to IEC TR 63158 with a stabilised 230V ($\pm 0,5$ %), with a maximum total harmonic distortion of the voltage (THDv) of 4 %, and a frequency of 50 Hz ($\pm 0,5$ %) supply. For dimmable light sources, the test shall be carried out at full load. The light source being tested, along with the sensor, should be located in an optically shielded environment to avoid disturbances from other light sources.

Please note that these requirements cannot currently be fulfilled by many LED retrofit light sources.

3. Information requirements

From 1 September 2021 the following information requirements shall apply:

- a. Information to be displayed on the light source itself

LightingEurope comment:

This requirement applies to all products declared as light sources, including containing products considered to be light sources (see comments to Article 2(4)).

For all light sources, except CTLS, LFL, CFLni, other FL, and HID, the value and physical unit of the useful luminous flux (lm) and correlated colour temperature (K) shall be displayed in a legible font on the surface if, after the inclusion of safety-related information, there is sufficient space available for it without unduly obstructing the light emission.

For directional light sources, the beam angle ($^{\circ}$) shall also be indicated.

If there is room for only two values, the useful luminous flux and the correlated colour temperature shall be displayed. If there is room for only one value, the useful luminous flux shall be displayed.

LightingEurope comment:

For light sources with user-controllable CCT or beam angle, the respective range of CCTs or beam angles that can be set may be displayed.

b. Information to be visibly displayed on the packaging

1. Light source placed on the market, not in a containing product

LightingEurope comment:

This requirement applies to all products declared as light sources, including containing products considered to be light sources, sold through a point-of-sale.

If a light source is placed on the market, not in a containing product, in a packaging containing information to be visibly displayed at a point-of-sale prior to its purchase, the following information shall be clearly and prominently displayed on the packaging:

LightingEurope comment:

A point of sale (PoS) is defined in Regulation (EU) No 2019/2015 on the energy labelling for light sources as a “physical location where the product is displayed or offered for sale, hire or hire-purchase to the customer.”

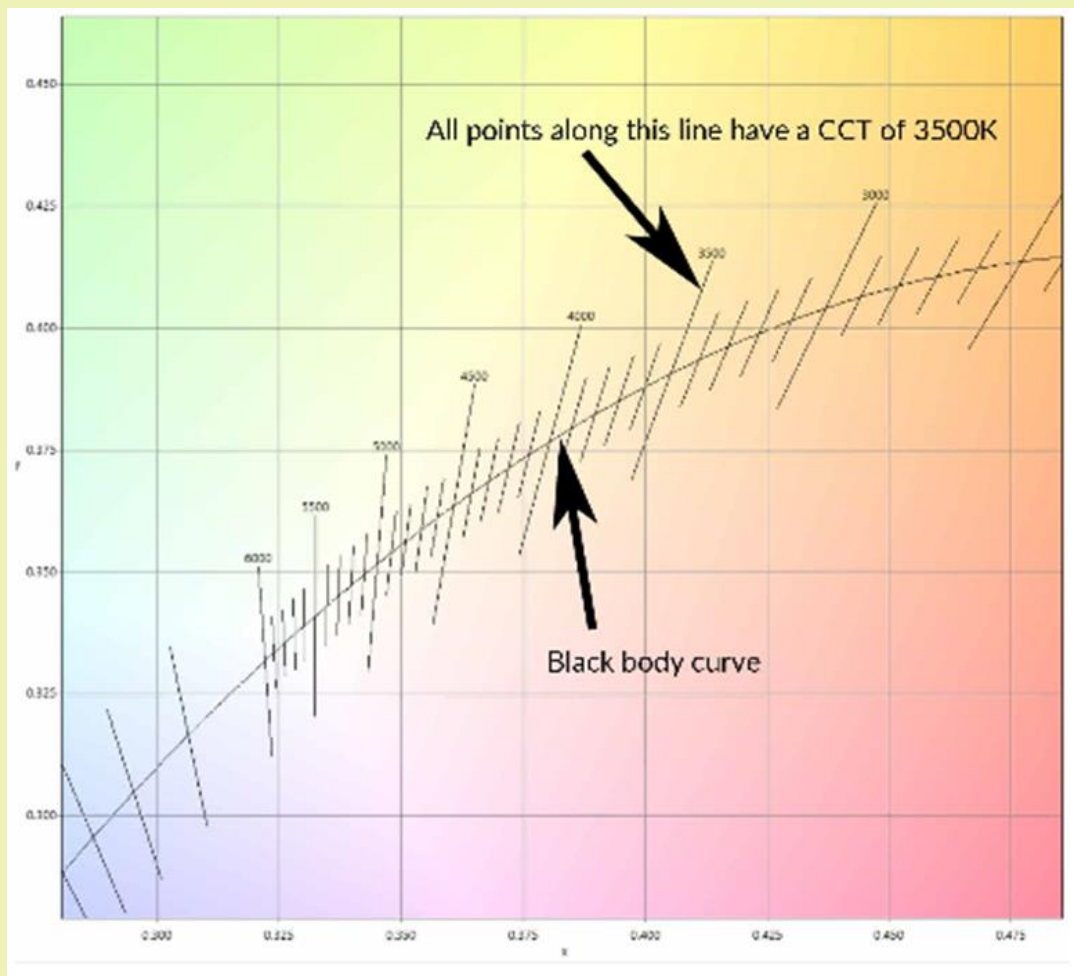
- a. the useful luminous flux (Φ_{use}) in a font at least twice as large as the display of the on-mode power (P_{on}), clearly indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°);
- b. the correlated colour temperature, rounded to the nearest 100 K, also expressed graphically or in words, or the range of correlated colour

temperatures that can be set;

LightingEurope comment:

Based on the identified test report colour coordinates, the manufacturer will identify the closest correlated colour temperature (CCT) line (100 K steps) of the diagram or any other method that is representative of the products and supported by the measurement data (see Figure 4).

Figure 5: Correlated colour temperature



- c. the beam angle in degrees (for directional light sources), or the range of beam angles that can be set;
- d. electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC);
- e. the $L_{70}B_{50}$ lifetime for LED and OLED light sources, expressed in hours;

LightingEurope comment:

In January 2018, LightingEurope published a guideline on evaluating the performance

of LED-based luminaires. This document also elaborates on the $L_{70}B_{50}$ lifetime for LED and OLED light sources. The LightingEurope guideline is available online.¹

Apart from the mandatory $L_{70}B_{50}$ lifetime provided by the manufacturer, other LED lifetimes based on better characteristics (e.g., $L_{90}B_{50}$) can be used as optional additional information (as long as the manufacturer complies with the required minimum lumen maintenance based on the $L_{70}B_{50}$ declared life). Please note that the $L_{90}B_{50}$ claimed lifetime will always be less than what would be achieved using the less onerous $L_{70}B_{50}$ rating.

- f. the on-mode power (P_{on}), expressed in W;
- g. the standby power (P_{sb}), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging;
- h. the networked standby power (P_{net}) for CLS, expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging;
- i. the colour rendering index, rounded to the nearest integer, or the range of CRI-values that can be set;
- j. if $CRI < 80$, and the light source is intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a $CRI < 80$, a clear indication to this effect. For HID light sources with useful luminous flux > 4000 lm, this indication is not mandatory;
- k. if the light source is designed for optimum use in non-standard conditions (such as ambient temperature $T_a \neq 25$ °C or specific thermal management is necessary): information on those conditions;
- l. a warning if the light source cannot be dimmed or can be dimmed only with specific dimmers or with specific wired or wireless dimming methods. In the latter cases a list of compatible dimmers and/or methods shall be provided on the manufacturer's website;
- m. if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place;
- n. if the light source is within the scope of Directive 2012/19/EU, without prejudice to marking obligations pursuant to Article 14(4) of Directive 2012/19/EU, or contains mercury: a warning that it shall not be

¹ LightingEurope, Guideline on evaluating the performance of LED-based luminaires (Brussels, January 2018).

disposed of as unsorted municipal waste.

LightingEurope comment:

Please note that Directive 2012/19/EU is also called the WEEE Directive (Waste Electrical and Electronic Equipment).

Items (a) to (d) shall be displayed on the packaging in the direction meant to face prospective buyer; for other items this is also recommended, if space permits.

For light sources that can be set to emit light with different characteristics, the information shall be reported for the reference control settings. In addition, a range of obtainable values may be indicated.

The information does not need to use the exact wording on the list above. Alternatively, it may be displayed in the form of graphs, drawings or symbols.

2. Separate control gears:

LightingEurope comment:

A separate control gear is a component that is not included in the light source. It can be 'independent' (able to be used without any additional enclosure) or built-in (requires an enclosure to comply with all applicable requirements). The built-in control gear can be located outside the containing product in a different enclosure or simply inside the containing product.

Pictures 10-13: examples of separate control gears



If a separate control gear is placed on the market as a stand-alone product and not as a part of a containing product, in a packaging containing information to be visibly displayed to potential buyers, prior to their purchase, the following information shall be clearly and prominently displayed on the packaging:

- a. the maximum output power of the control gear (for HL, LED and OLED)

or the power of the light source for which the control gear is intended (for FL and HID);

- b. the type of light source(s) for which it is intended;
- c. the efficiency in full-load, expressed in percentage;
- d. the no-load power (P_{no}), expressed in W and rounded to the second decimal, or the indication that the gear is not intended to operate in no-load mode. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in the technical documentation and on websites;
- e. the standby power (P_{sb}), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in the technical documentation and on websites;
- f. where applicable, the networked standby power (P_{net}), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging but shall nonetheless be declared in the technical documentation and on websites;
- g. a warning if the control gear is not suitable for dimming of light sources or can be used only with specific types of dimmable light sources or using specific wired or wireless dimming methods. In the latter cases, detailed information on the conditions in which the control gear can be used for dimming shall be provided on the manufacturer's or importer's website;
- h. a QR-code redirecting to a free-access website of the manufacturer, importer or authorised representative, or the internet address for such a website, where full information on the control gear can be found.

The information does not need to use the exact wording on the list above. Alternatively, it may be displayed in the form of graphs, drawings or symbols.

LightingEurope comment:

Please note that abovementioned paragraph refers to (a-h) of Annex II.3(b)(2).

- c. Information to be visibly displayed on a free-access website of the manufacturer, importer or authorised representative

LightingEurope comment:

For separate control gears, the mandatory product requirements shall be published on a free-access public website. This is applicable for separate control gears as well as control gears sold in a containing product. For light sources, the information requirements are given in the Energy Labelling Regulation for light sources (Regulation 2019/2015).

1. Separate control gears:

For any separate control gear that is placed on the EU market, the following information shall be displayed on at least one free-access website:

- a. the information specified in point 3(b)(2), except 3(b)(2)(h);
- b. the outer dimensions in mm;
- c. the mass in grams of the control gear, without packaging, and without lighting control parts and non-lighting parts, if any and if they can be physically separated from the control gear;
- d. instructions on how to remove lighting control parts and non-lighting parts, if any, or how to switch them off or minimise their power consumption during control-gear testing for market surveillance purposes;
- e. if the control gear can be used with dimmable light sources, a list of minimum characteristics that the light sources should have to be fully compatible with the control gear during dimming, and possibly a list of compatible dimmable light sources;
- f. recommendations on how to dispose of it at the end of its life in line with Directive 2012/19/EU.

The information does not need to use the exact wording in the list above. Alternatively, it may be displayed in the form of graphs, drawings or symbols.

d. Technical documentation (1) Separate control gears:

1. Separate control gears:

The information specified in point 3(c)(1) of this Annex shall also be contained in the technical documentation file drawn up for the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC.

LightingEurope comment:

Please note that Annex II, Point 3(c)(2) does not exist. The correct reference is to Annex II.3(c)(1).

e. Information for products specified in point 3 of Annex III

For the light sources and separate control gears specified in point 3 of Annex III the intended purpose shall be stated in the technical documentation for compliance assessment as per Article 5 of this Regulation and on all forms of packaging, product information and advertisement, together with an explicit indication that the light source or separate control gear is not intended for use in other applications.

The technical documentation file drawn up for the purposes of conformity assessment, in accordance with Article 5 of this Regulation shall list the technical parameters that make the product design specific to qualify for the exemption.

In particular for light sources indicated in point 3(p) of Annex III it shall be stated: 'This light source is only for use by photo sensitive patients. Use of this light source will lead to increased energy cost compared to an equivalent more energy efficient product.'

Annex III: Exemptions

1. This Regulation shall not apply to light sources and separate control gears specifically tested and approved to operate:

LightingEurope comment:

Please note that some product categories have not been exempted and therefore must comply with ecodesign requirements. For example, no exemption is foreseen for clear (colourless infrared) reflector light sources with an E27 base for heating purposes of 100 W and above for animal care and restaurants.

This problem has been communicated to the Commission for further clarification.

- a. in potentially explosive atmospheres, as defined in Directive 2014/34/EU;
- b. for emergency use, as set out in Directive 2014/35/EU;

LightingEurope comment:

Only those products marketed solely for use in emergency lighting conditions are exempt from the requirements.

- c. in radiological and nuclear medicine installations, that are subject to radiation safety standards as set out in Council Directive 2013/59/EURATOM;²
- d. in or on military or civil defence establishments, equipment, ground vehicles, marine equipment or aircraft, as set out in Member States' regulations or in documents issued by the European Defence Agency;
- e. in or on motor vehicles, their trailers and systems, interchangeable towed equipment, components and separate technical units as set out in Regulation (EC) No 661/2009, Regulation (EU) No 167/2013 and Regulation (EU) No 168/2013;
- f. in or on non-road mobile machinery as set out in Regulation (EU) 2016/1628 and in or on their trailers;
- g. in or on interchangeable equipment as set out in Directive 2006/42/EC intended to be towed or to be mounted and fully raised from the ground or that cannot articulate around a vertical axis when the vehicle to which it is attached

² Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation (OJ L 13, 17.1.2014, p. 1).

is in use on a road by vehicles as set out in Regulation (EU) No 167/2013;

- h.** in or on civil aviation aircraft, as set out in Commission Regulation (EU) No 748/2012;
- i.** in railway vehicle lighting, as set out in Directive 2008/57/EC;
- j.** in marine equipment, as set out in Directive 2014/90/EU;
- k.** in medical devices, as set out in Council Directive 93/42/EEC or Regulation (EU) 2017/745 and in vitro medical devices as set out in Directive 98/79/EC.

For the purpose of this point, 'specifically tested and approved' means that the light source or separate control gear:

- has been specifically tested for the mentioned operating condition or application, according to the European legislation mentioned or related implementing measures, or relevant European or international standards, or, in the absence of these, according to relevant Member States legislation; and
- is accompanied by evidence, to be included in the technical documentation, in the form of a certificate, a type approval mark, a test report, that the product has been specifically approved for the mentioned operating condition or application; and
- is placed on the market specifically for the mentioned operating condition or application, as evidenced at least by the technical documentation, and except for point (d), information on the packaging and any advertising or marketing materials.

2. In addition, this Regulation shall not apply to:

- a.** double-capped fluorescent T5 light sources with power $P \leq 13$ W;
- b.** electronic displays (e.g. televisions, computer monitors, notebooks, tablets, mobile phones, e-readers, game consoles), including displays within the scope of Commission Regulation (EU) 2019/2021, Commission Regulation (EU) No 617/2013;
- c.** light sources and separate control gears in battery-operated products, including but not limited to e.g. torches, mobile phones with an integrated torch light, toys including light sources, desk lamps operating only on batteries, armband lamps for cyclists, solar-powered garden lamps;
- d.** light sources for spectroscopy and photometric applications, such as for example UV-VIS spectroscopy, molecular spectroscopy, atomic absorption spectroscopy, nondispersive infrared (NDIR), fourier-transform infrared (FTIR), medical analysis, ellipsometry, layer thickness measurement, process monitoring or environ-mental monitoring;

- e. light sources and separate control gears on bicycles and other non-motorised vehicles.
3. Any light source or separate control gear within the scope of this Regulation shall be exempt from the requirements of this Regulation, with the exception of the information requirements set out in point 3(e) of Annex II, if they are specifically designed and marketed for their intended use in at least one of the following applications:
- a. signalling (including, but not limited to, road-, railway-, marine- or air traffic-signalling, traffic control or airfield lamps);
 - b. image capture and image projection (including, but not limited to, photocopying, printing (directly or in pre-processing), lithography, film and video projection, holography);
 - c. light sources with specific effective ultraviolet power >2 mW/klm and intended for use in applications requiring high UV-content;
 - d. light sources with a peak radiation around 253,7 nm and intended for germicidal use (destruction of DNA);
 - e. light sources emitting 5 % or more of total radiation power of the range 250-800 nm in the range of 250-315 nm and/or 20 % or more of total radiation power of the range 250-800 nm in the range of 315-400 nm, and intended for disinfection or fly trapping;
 - f. light sources with the primary purpose of emitting radiation around 185,1 nm and intended to be used for the generation of ozone;
 - g. light sources emitting 40 % or more of total radiation power of the range 250-800 nm in the range of 400-480 nm, and intended for coral zooxanthellae symbioses;
 - h. FL light sources emitting 80 % or more of total radiation power of the range 250-800 nm in the range of 250-400 nm, and intended for sun-tanning;
 - i. HID light sources emitting 40 % or more of total radiation power of the range 250-800 nm in the range of 250-400 nm, and intended for sun-tanning;
 - j. light sources with a photosynthetic efficacy >1.2 $\mu\text{mol/J}$, and/or emitting 25 % or more of total radiation power of the range 250-800 nm in the range of 700-800 nm, and intended for use in horticulture;
 - k. HID light sources with correlated colour temperature CCT $> 7\ 000$ K and intended for use in applications requiring such a high CCT;
 - l. light sources with a beam angle of less than 10° and intended for spot- lighting applications requiring a very narrow light beam;

- m. halogen light sources with cap-type G9.5, GX9.5, GY9.5, GZ9.5, GZX9.5, GZY9.5, GZZ9.5, K39d, G9.5HPL, G16d, GES/E40 (low voltage (24V) silver crown only), GX16, GX16d, GY16, G22, G38, GX38, GX38Q, P28s, P40s, PGJX28, PGJX 36, PGJX50, R7s with a luminous flux > 12 000 lm, QXL, designed and marketed specifically for scene-lighting use in film studios, TV studios, and photographic studios, or for stage-lighting use in theatres, discos and during concerts or other entertainment events;
- n. colour-tuneable light sources that can be set to at least the colours listed in this point and which have for each of these colours, measured at the dominant wavelength, a minimum excitation purity of:

Blue	440nm – 490nm	90 %
Green	520nm – 570nm	65 %
Red	610nm – 670nm	95 %

and are intended for use in applications requiring high-quality coloured light;

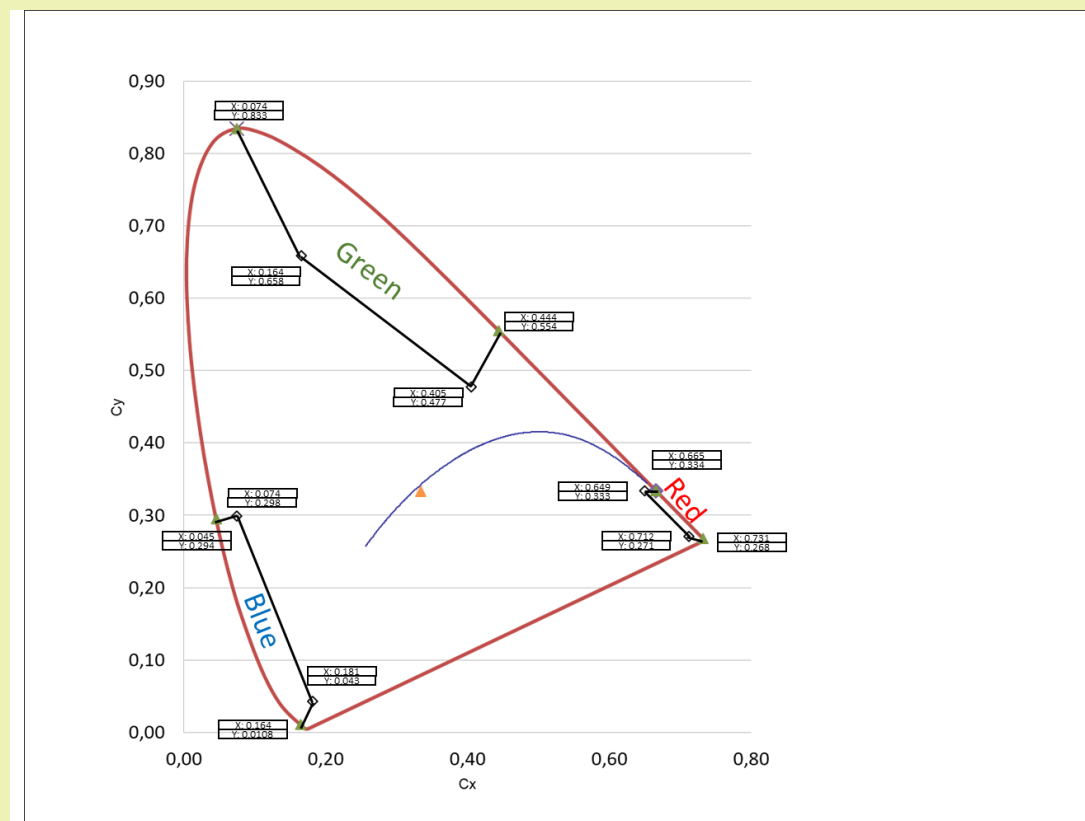
LightingEurope comment:

Figure 6 is based on Figure 1 and its colours (see page 17).

The excitation purity is defined in Annex I.9:

“‘excitation purity’ means a percentage computed for a CTLS set to emit light of a certain colour, using a procedure further defined in standards, by drawing a straight line on an (x and y) colour space graph from a point with colour coordinates $x=0,333$ and $y=0,333$ (achromatic stimulus point), going through the point representing the (x and y) colour coordinates of the light source (point 2), and ending on the outer border of the colour space (locus; point 3). The excitation purity is computed as the distance between points 1 and 2 divided by the distance between points 1 and 3. The full length of the line represents 100 % colour purity (point on the locus). The achromatic stimulus point represents 0 % colour purity (white light);”

Figure 6: Colour-tuneable light sources



- o. light sources accompanied by an individual calibration certificate detailing the exact radiometric flux and/or spectrum under specified conditions, and intended for use in photometric calibration (of e.g. wavelength, flux, colour temperature, colour rendering index), or for laboratory use or quality control applications for the evaluation of coloured surfaces and materials under standard viewing conditions (e.g. standard illuminants);
- p. light sources provided specifically for use by photosensitive patients, to be sold in pharmacies and other authorised selling points (e.g. suppliers of disability products), upon presentation of a medical prescription;
- q. incandescent light sources (not including halogen light sources) fulfilling all of the following conditions: power ≤ 40 W, length ≤ 60 mm, diameter ≤ 30 mm, declared suitable for operation at ambient temperature ≥ 300 °C, and intended for use in high temperature applications such as ovens;
- r. halogen light sources fulfilling all of the following conditions: cap-type G4, GY6.35 or G9, power ≤ 60 W, declared suitable for operation at ambient temperature ≥ 300 °C, and intended for use in high temperature applications such as ovens;
- s. Incandescent light sources with blade contact-, metal lug-, cable-, litz wire-,

metric thread-, pin base- or non- standard customised electrical interface, encasing made from quartz-glass tubes, specifically designed and exclusively marketed for industrial or professional electro-heating equipment (such as stretch blow- moulding process in PET-Industry, 3D-printing, photovoltaic and electronic manufacturing processes, drying or hardening of adhesives, inks, paint or coatings);

- t. halogen light sources fulfilling all of the following conditions: R7s cap, CCT ≤ 2500 K, length not in the ranges 75-80 mm and 110-120 mm, specifically designed and marketed for industrial or professional electro- heating equipment (e.g. stretch blow-moulding process in PET-Industry, 3D-printing, gluing, inks, paint and coating hardening);
- u. single capped fluorescent lamps (CFLni) having a diameter of 16 mm (T5), 2G11 4 pin base, with CCT = 3 200 K and chromaticity coordinates $x=0,415$ $y=0,377$, or with CCT=5 500 K and chromaticity coordinates $x=0,330$ $y=0,335$, specifically designed and marketed for studio and video applications for traditional filmmaking;
- v. LED or OLED light sources, complying with the definition of 'original works of art' as defined in Directive 2001/84/EC, made by the artist him/herself in a limited number below 10 pieces;
- w. light sources that
 1. are specifically designed and exclusively marketed for scene-lighting use in film- studios, TV-studios and locations, and photographic-studios and locations, or for stage-lighting use in theatres, during concerts or other entertainment events;

and that:

2. meet at least one of the following specifications:

LightingEurope comment:

Please note that some product categories have not been exempted. It should further be noted that it is not possible for light sources to fulfil two or more of the specifications listed under Point 3(w)(2), as they are also required to fulfil the requirement under Point 3(w)(1). No product could fulfil all three requirements of Point 3(w).

This problem has been communicated to the Commission for further clarification.

- a. LED with power ≥ 100 W and high CRI > 90 ;
- b. GES/E40, K39d socket with changeable Colour Temperature down to

1800 K (undimmed), used with low voltage power supply;

- c. LED with power $\geq 180\text{W}$ and arranged to direct output to an area smaller than the light emitting surface;
 - d. Incandescent light source that is DWE type and has 650 W power, 120 V voltage and pressure screw terminal;
 - e. LED with power $\geq 100\text{ W}$ that allows the user to set different correlated colour temperatures for the emitted light;
 - f. LFL T5 with G5 cap with CRI ≥ 85 and CCT 2 900, 3 000, 3 200, 5 600 or 6 500 K.
- x. incandescent DLS fulfilling all of the following conditions: E27 cap, clear envelope, power $\geq 100\text{ W}$ and $\leq 400\text{ W}$, CCT $\leq 2\,500\text{ K}$, specifically designed and marketed for infrared heating.
4. CLS and CSCG designed and marketed specifically for scene-lighting use in film-studios, TV-studios and locations, and photographic studios and locations, or for stage-lighting use in theatres, discos and during concerts or other entertainment events, for connection to high speed control networks (utilising signalling rates of 250,000 bits per second and higher) in always-listening mode, shall be exempt from the requirements on standby (P_{sb}) and on networked standby (P_{net}) of points 1(a) and 1(b) of Annex II.

LightingEurope comment:

This exemption exists because control gear in these applications is based on multiple voltage conversion stages and is also used to power non- lighting parts (motors, fans, user interface). Related efficiency losses cannot all be compensated. Avoiding these losses would have a significant impact on the luminaire design, limiting functionalities, adding costs and requiring additional materials.

5. Light sources specifically designed and exclusively marketed for use in products in the scope of Commission Regulations 2019/2023, 2019/2022, 932/2012 and 2019/2019, shall be exempt from the requirements regarding lumen maintenance factor and survival factor set out in point 2 Table 4 of Annex II, and from the lifetime information requirement set out in point 3(b)(1)(e) of Annex II;

Annex IV: Verification procedure for market surveillance purposes

The verification tolerances defined in this Annex relate only to the verification by Member State authorities of the declared values and shall not be used by the manufacturer, importer or authorised representative as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

Where a model has been designed to be able to detect it is being tested (e.g. by recognising the test conditions or test cycle), and to react specifically by automatically altering its performance during the test with the objective of reaching a more favourable level for any of the parameters specified in this Regulation or included in the technical documentation or included in any of the documentation provided, the model and all equivalent models shall be considered not compliant.

LightingEurope comment:

The use of external packaging (to protect it during transport) to deliver a single item already placed on the EU market does not imply the use of a new model if the original packaging is kept inside the transport box (the original packaging will provide all required information) and the product itself has not changed and maintains its original coding (please note that the light source model is defined by the light source manufacturer only).

Pictures 14-16: Examples of packaging



As part of verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following procedure:

1. The Member State authorities shall verify one single unit of the model for points 2(a), 2(b), 2(d) and 2(e) of this Annex.

The Member State authorities shall verify 10 units of the light source model or 3 units of the separate control gear model. The verification tolerances are laid down in Table 6 of this Annex.

2. The model shall be considered to comply with the applicable requirements if:
 - a. the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer, importer or authorised representative than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
 - b. the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer, importer or authorised representative does not contain values that are more favourable for the manufacturer, importer or authorised representative than the declared values; and
 - c. when the authorities of the Member State test the units of the model, the determined values comply with the respective verification tolerances as given in Table 6 of this Annex, where 'determined value' means the arithmetic mean over the tested units of the measured values for a given parameter or the arithmetic mean of parameter values calculated from measured values and;
 - d. when the Member State authorities check the unit of the model, they find that the manufacturer, importer or authorised representative has put in place a system that complies with the requirements in the second paragraph of Article 7; and
 - e. when the Member State authorities check the unit of the model, it complies with the requirement in the third paragraph of Article 7 and the information requirements in point 3 of Annex II.
3. If the results referred to in point 2(a), (b), (c), (d) or (e) are not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.
4. The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision is taken on the non-compliance of the model according to points 3 or the second paragraph of this Annex.

The authorities of the Member State shall only apply the verification tolerances that are set out in Table 6 and shall use only the procedure described in this Annex. For the parameters in Table 6, no other tolerances, such as those set out in harmonised

standards or in any other measurement method, shall be applied.

Table 6 – Verification tolerances

Parameter	Sample size	Verification tolerances
Full-load on- mode power P_{on} [W]:		
$P_{on} \leq 2W$	10	The determined value shall not exceed the declared value by more than 0,20 W.
$2W < P_{on} \leq 5W$	10	The determined value shall not exceed the declared value by more than 10 %.
$5W < P_{on} \leq 25W$	10	The determined value shall not exceed the declared value by more than 5 %.
$25W < P_{on} \leq 100W$	10	The determined value shall not exceed the declared value by more than 5 %.
$100W < P_{on}$	10	The determined value shall not exceed the declared value by more than 2,5 %.
Displacement factor [0-1]	10	The determined value shall not be less than the declared value minus 0,1 units.
Useful luminous flux Φ_{use} [lm]	10	The determined value shall not be less than the declared value minus 10 %.
No-load power P_{no} , Standby power P_{sb} and Networked standby power P_{net} [W]	10	The determined value shall not exceed the declared value by more than 0,10 W.
CRI [0-100]	10	The determined value shall not be less than the declared value by more than 2,0 units.
Flicker [P_{st}^{LM}] and stroboscopic effect [SVM]	10	The determined value shall not exceed the declared value by more than 0.1.
Colour consistency [MacAdam ellips steps]	10	The determined number of steps shall not exceed the declared number of steps. The centre of the MacAdam ellipse shall be the centre declared by the supplier with a tolerance of 0,005 units.
Beam angle (degrees)	10	The determined value shall not deviate from the declared value by more than 25 %.
Control gear efficiency [0-1]	3	The determined value shall not be less than the declared value minus 0,05 units.
Lumen maintenance factor (for LED and OLED)	10	The determined XLMF% of the sample following the test in Annex V of this Regulation shall not be less than $X_{LMF,MIN}\%$.
Survival factor (for LED and OLED)	10	At least 9 light sources of the test sample must be operational after completing the test in Annex V of this Regulation.
Excitation purity [%]	10	The determined value shall not be less than the declared value minus 5 %.
Correlated colour temperature [K]	10	The determined value shall not deviate from the declared value by more than 10 %.

LightingEurope comment:

(Please note that there is no Table 5 in this regulation.)

The tolerances, presented in Annex IV on verification procedure for market surveillance purposes, of Regulation (EU) No 2019/2020, provide limit values to be taken into account during verification. Measurements carried out by manufacturers, importers, and market surveillance authorities (MSAs) across the Union (see Regulation (EU) No 2016/2282) shall consider the measurement uncertainty when comparing the measurements against those limit values. Normally, the measurement uncertainty is affected by many factors, including measurement equipment (incl. the accuracy and the calibration of the instruments), testing setup, testing conditions, testing procedures, and testing methods.

For light sources with linear geometry which are scalable but of very long length, such as LED strips or strings, verification testing of market surveillance authorities shall consider a length of 50 cm, or, if the light source is not scalable there, the nearest value to 50 cm. The light source manufacturer or importer shall indicate which separate control gear is suitable for this length.

LightingEurope comment:

Please note that a light source with long length is within scope when the light source at total length has lumen output of more than 60 lumen, because that is the light source to be checked if it is within scope of the regulation. Only the verification testing will be performed at length of 50 cm.

Concerning the EPREL registration, the public part of EPREL will inform on the total light source (full length), while the compliance part must include data on the 50 cm measurement and its results.

When verifying if a product is a light source, market surveillance authorities shall compare the measured values for chromaticity coordinates (x and y), luminous flux, luminous flux density, and colour rendering index directly with the limit values set out in the definition for light source of Article 2 of this Regulation, without applying any tolerances. If any of the 10 units in the sample satisfies the conditions for being a light source, the product model shall be considered to be a light source.

Light sources that allow the end-user to control, manually or automatically, directly or remotely, the luminous intensity, colour, correlated colour temperature, spectrum, and/or beam angle of the emitted light shall be evaluated using the reference control settings.

Annex V: Functionality after endurance testing

Models of LED- and OLED- light sources shall undergo endurance testing to verify their lumen maintenance and survival factor. This endurance testing consists of the test method outlined below. The authorities of a Member State shall test 10 units of the model for this test.

The endurance test for LED and OLED light sources shall be conducted as follows:

- a. Ambient conditions and test setup:
 - i. The switching cycles are to be conducted in a room with an ambient temperature of 25 ± 10 °C and an average air velocity of less than 0,2 m/s.

LightingEurope comment:

Notwithstanding the requirements of paragraph (ii) below, it is understood that light sources that are designed and specified to be mounted on a heat sink may be mounted on a heat sink during testing. The thermal characteristics of such a heat sink must be representative of the heat sink used in typical applications of the light source.

- ii. The switching cycles on the sample shall be conducted in free air in a vertical base-up position. However, if a manufacturer or importer has declared the light source suitable for use in a specific orientation only, then the sample shall be mounted in that orientation.
 - iii. The applied voltage during the switching cycles shall have a tolerance within 2 %. The total harmonic content of the supply voltage shall not exceed 3 %. Standards provide guidance on the supply voltage source. Light sources designed to be operated on mains voltage shall be tested at 230 V, 50 Hz supply, even if the products are able to be operated on variable supply conditions.
- b. Endurance test method:
 - i. Initial flux measurement: measure the luminous flux of the light source prior to starting the endurance test switching cycle.
 - ii. Switching cycles: operate the light source for 1 200 cycles of repeated, continuous switching cycles without interruption. One complete switching cycle consists of 150 minutes of the light source switched ON at full power followed by 30 minutes of the light source switched OFF. The hours of operation recorded (i.e. 3 000 hours) include only the periods of the switching cycle when the light source was switched ON, i.e. the total test time is 3 600 hours.

- iii. Final flux measurement: at the end of the 1 200 switching cycles, note if any light sources have failed (see 'Survival factor' in Annex IV, Table 6 of this Regulation) and measure the luminous flux of the light sources that have not failed.
- iv. For each of the units in the sample which have not failed, divide the measured final flux by the measured initial flux. Average the resulting values over all the units that did not fail to compute the determined value for the lumen maintenance factor X_{LMF} %.

Annex VI: Benchmarks

For the environmental aspects that were considered significant and are quantifiable, the best available technology on the market, at the time of entry into force of this Regulation, is indicated below.

The best available technology on the market for light sources in terms of their efficacy based on useful luminous flux was identified as follows:

- Mains voltage non-directional light sources: 120-140 lm/W
- Mains voltage directional light sources: 90-100 lm/W
- Directional light sources not operating on the mains: 85- 95 lm/W
- Linear light sources (tubes): 140-160 lm/W

The best available technology on the market for separate control gears has an energy efficiency of 95 %.

Features required in certain applications, e.g. a high colour rendering, might prevent products offering those features from achieving these benchmarks.

The best available technology on the market for light sources and separate control gears do not have any mercury content.

Summary of main ecodesign requirements by product type

Light sources and separate control gears

SLR requirement / product	Non-mains LED lamp or module (NMLS)	Mains LED lamp or module (MLS)	Non-mains non-LED lamp (e.g., halogen G4) (NMLS)	Mains non-LED lamp (e.g., halogen G9) (MLS)	Separate Control Gear (SCG)	Exempt types (Annex III.3) (LS or SCG)
Article 4 - Removal LS/SCG						
1. Replaced common tools or	-	-	-	-	-	-
Technical justification or	-	-	-	-	-	-
Removal info for test	-	-	-	-	-	-
2. Replaceability information	-	-	-	-	-	-
3. EOL dismantling information	-	-	-	-	-	-
Annex II.1 - Energy efficiency						
1.(a) Energy efficiency LS	LS	LS	LS	LS	-	-
1.(b) Energy efficiency SCG	-	-	-	-	SCG	-
Annex II.2 - Table 4						
Colour Rendering	LS	LS	LS	LS	-	-
Displacement factor	-	LS	-	-	-	-
Lumen Maintenance factor	LS	LS	-	-	-	-
Survival factor	LS	LS	-	-	-	-
Colour consistency	LS	LS	-	-	-	-
Flicker P_{st}^{LM}	-	LS	-	-	-	-
Stroboscopic Effect SVM	-	LS	-	-	-	-

SLR requirement / product	Non-mains LED lamp or module (NMLS)	Mains LED lamp or module (MLS)	Non-mains non-LED lamp (e.g., halogen G4) (NMLS)	Mains non-LED lamp (e.g., halogen G9) (MLS)	Separate Control Gear (SCG)	Exempt types (Annex III.3) (LS or SCG)
Annex II.3 - Information requirements						
3(a) LS marking	LS	LS	Some LS ³	Some LS ²	-	-
3(b)(1) LS packaging marking ⁴	LS	LS	LS	LS	-	-
3(b)(2) SCG packaging marking ⁵	-	-	-	-	SCG	-
3(c)(1) SCG website info	-	-	-	-	SCG	-
3(d)(1) SCG technical docs	-	-	-	-	SCG	-
3(e) special (purpose) marking	-	-	-	-	-	LS or SCG ⁶

Please keep in mind that:

LS = Applies to Light Source

SCG = Applies to Separate Control Gear

³ See Annex II.3(a) for full list of lamps that do not require marking.

⁴ See Annex II.3(b)(1): not applicable if light source is placed on market in containing product.

⁵ See Annex II.3(b)(2): not applicable if separate control gear is placed on market in containing product.

⁶ See Annex III.3 for applicable products. Only marking applies, exempt from other requirements.

Containing products

SLR requirement / product	Mains luminaire (containing product)									Non-mains luminaire (containing product) (No SCG)		
	1	2	3	4	5	6	7	8	9	10	11	12
Luminaire design scenario												
Light Source (LS) type	Replac. LS	Replac. LS	Replac. LS	Remov. LS	Remov. LS	Remov. LS	Non-Remov. LS	Non-Remov. LS	Non-Remov. LS	Replac. LS	Remov. LS	Non-remov. LS
Separate Control Gear (SCG) type	Replac. SCG	Remov. SCG	Non-Remov. SCG	Replac. SCG	Remov. SCG	Non-Remov. SCG	Replac. SCG	Remov. SCG	Non-Remov. SCG	NO SCG	NO SCG	NO SCG
Article 4 - Removal LS/SCG												
1. Replaced common tools or	LS/S CG	LS	LS	SCG	-	-	SCG	-	-	LS	-	-
Technical justification or	-	SCG	SCG	LS	LS/S CG	LS/S CG	LS	LS/S CG	-	-	LS	-
Removal info for test	LS/S CG	LS/S CG	LS	LS/S CG	LS/S CG	LS	SCG	SCG	-	LS	LS	-
2. Replaceability information	Rep/Rep	Rep/Not	Rep/Not	Not/Rep	Not/Not	Not/Not	Not/Rep	Not/Not	-	Rep/-	Not/-	-
3. EOL dismantling information	CP	CP	CP	CP	CP	CP	CP	CP	-	CP	CP	-
Annex II.1 - Energy efficiency												
1.(a) Energy efficiency LS	a. For CE-marked replaceable or removable LS or SCG no requirements apply to the CP (Luminaire designs 1, 2, 4, 5, 10 & 11) b. For non-CE-marked replaceable or removable LS or SCG placed on the market as part of the luminaire the CP manufacturer is responsible for conformity (Luminaire designs as (a)) c. For non-removable SCG used with a replaceable or removable LS the CP is considered as a SCG (Luminaire designs 3 & 6) d. For non-removable LS used with a replaceable, removable or no SCG the CP is considered as a NMLS (Luminaire designs 7, 8 & 12) e. For non-removable LS and SCG the CP is considered as an MLS (Luminaire design 9) f. For (b), (c), (d) and (e) see the matrix for LS and SCG requirements											
1.(b) Energy efficiency SCG												
Annex II.2, Table 4												
Colour Rendering												
Displacement factor												
Lumen Maintenance factor												
Survival factor												
Colour consistency												
Flicker P _{st} ^{LM}												
Stroboscopic Effect SVM												
Annex II.3 - Information requirements												
3(a) LS marking												
3(b)(1) LS packaging marking												
3(b)(2) SCG packaging marking												
3(c)(1) SCG website info												
3(d)(1) SCG technical docs												
3(e) special (purpose) marking												

Please keep in mind that:

LS = Requirement applies for Light Source	SCG = Requirement applies for control gear	CP = Requirement applies to containing product (luminaire)
Rep/Rep = Replaceable LS and replaceable SCG	Rep/Not = Replaceable LS and non-replaceable SCG	Not/Not = Non-replaceable LS and non-replaceable SCG

Replaceable = Component (light source and / or control gear) can be replaced with the use of common available tools and without permanent damage to the containing product

Removable = Independent from whether it can be replaced, the component (light source and / or control gear) can be removed without permanently damaging the component in order for the component to be verified by market surveillance authorities

Non-removable = Component (light source and / or control gear) cannot be removed without permanently damaging the component, so cannot be verified by market surveillance authorities