LIA LABORATORY ENERGY RELATED PRODUCT CONFORMITY SCHEME

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1.1. Introduction

This certification scheme has been developed in accordance with the LIA Laboratory Limited's (LIA Laboratory) Product Certification System, which is detailed in the Product Certification System Document. The scheme is operated in accordance with the LIA Laboratory's Quality and Operations Manuals. The purpose of this scheme is to assess the compliance of LED light sources.

Applicants who have been assessed and meet the requirements of the scheme are granted certification. Voluntary certification to this scheme gives third party confirmation of the manufacturer's declaration in accordance with the Commission Regulation (EU) 2019/2020 – Ecodesign requirements for light sources and separate controlgears and UK regulation SI 2021 No. 1095 - The Ecodesign for Energy-Related Products and Energy Information (Lighting Products) Regulations 2021.

Note that the client has an obligation to inform LIA Laboratory of any changes to the certified product(s), which might affect certification.

The certification service is accessible to all applicants who fall under the certification scope.

1.2. Definitions & Abbreviations

The following definitions and abbreviations are used throughout the document. Other definitions are as given in the relevant standards, directives or regulation (refer to Annex 1).

Scope Detailed specification of certified products and associated components.

Light Source - 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**.**
Mains light source (MLS) - a light source that can be operated directly on the mains electricity supply.

Non-mains light source (NMLS) - a light source that requires a separate control gear to operate on the mains.

Directional light source (DLS) - 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°).

Non-directional light source (NDLS) - a light source that is not a directional light source.

LED light source – electric light source based on LED technology. An LED light source can take the form of an LED module or an LED lamp.

Containing product – a product containing one or more light sources. Examples of containing products are luminaires that can be taken apart to allow separate verification of the contained light source(s). If a containing product cannot be taken apart for verification of the light source the entire containing product is to be considered a light source.

Lifetime ($L_{70}B_{50}$ value) – The manufacturer declared lifetime of LED light sources given in hours. This is the value between the start of their use, and the moment when for 50% of a population of light sources the light output has degraded to a value below 70% of the initial luminous flux. L defines the percentage of lumen output comparing with the initial lumen output. B defines the light source population as a percentage.

1.3. LED light source requirements

1.3.1. Light sources types covered by the scheme

Only LED light sources (LED modules, LED lamps, etc.) are covered by this scheme. This includes those used in containing products as well as independent light sources.

Luminaires falling into the category of light source (non-containing products), can be also covered by this scheme. However the product will be assessed for suitability and included at the discretion of the LIA laboratory.

1.3.2. Test requirements

The LED light source will be subjected to a set of performance criteria with limits derived from regulations SI 2021 No. 1095 and EU 2019/2020 to determine compliance with the certification scheme and the suitability for using the scheme logo(s) on the packaging and product website.

1.3.3. Number of samples

A total of 10 samples of the same light source will be required for the assessment.

If there are family variants of the light source, at least 2 additional samples, which are different to main product, may be required. Samples required for additional assessment to be conducted will be specified before commencing the testing/certification process.

An addition 2 samples will be required each year for ongoing surveillance purposes.

For directional products, goniophotometric scan at 0 hours with 2 samples shall be conducted to measure the beam angle, luminous intensity, etc..

For non-directional products, at least one goniophotometric scan shall be conducted to confirm that product is non-directional and to measure the beam angle.

1.3.4. Compliance to LIA Laboratory Energy Related Product Conformance Scheme

A full approval will be issued after successful completion of the 3600 hour life test and photometric evaluation. A copy of the schedule of approval will be uploaded to the LIA Laboratory certification website at www.lialabcert.org.uk for public access once approval is issued, a representation of the type of data that will be shown can be found in Appendix A.

Provisional approval (test report) will be given after successful completion of initial measurement at 0 hours and when all other applicable criteria have been met (refer to Table 1).

The provisional approval will be withdrawn should more than 1 sample fail the 3600 hour life test, and/or all other applicable criteria have not been met (refer to Table 1). However, if sample fails, it can be replaced by another two new samples, which have to successfully pass the endurance test.

Results from assessment will be compared against client's declared values. Declared values shall be in line with requirements as specified in Annex IV of regulation EU 2019/2020, table 6. If no declared values are provided, client can use LIA Laboratory results as reference.

1.4. Performance Testing

All life tests will be carried out in a room with controlled environmental conditions for a total of 3600 hours at the rated voltage and/or current of the product.

Life test switching cycles shall be as per a regulations SI 2021 No. 1095 and EU 2019/2020, 3 hour cycles of 150 minutes – ON, 30 minutes – OFF, with 1200 cycles in total.

The switching cycles are to be conducted in a room with an ambient temperature 25±5°C and an average air velocity of less than 0.2m/s.

The switching cycles on the samples are to be conducted in free air in a vertical base-up position (unless the manufacturer declares that the light source is suitable for use in a specific orientation only). LED modules shall be fixed to suitable heatsink (if appropriate).

The applied voltage during the switching cycles will be stabilised within a tolerance of 2%. Light sources designed to be operated on mains voltage are to be tested at 230V, 50Hz.

If constant current light sources are provided for assessment, the light sources are to be powered at the maximum constant current, as declared by the light source manufacturer. Once the specified value of constant current is achieved, the voltage shall be stabilised within 2%.

Initial measurements shall be carried out at 0 hours for the following parameters on 10 light sources:

- Full-load on-mode power P_{on} (W);
- Displacement factor (0-1) (if applicable);
- Useful luminous flux Φ_{use} (lm);
- No-load power P_{no}, Standby power, P_{sb} and Networked standby power P_{net} (W) (if applicable);
- Colour rendering index CRI (0-100);
- Flicker (P_{st} LM) and stroboscopic effect (SVM) (if applicable);
- Colour consistency (MacAdam ellips steps);
- Beam angle (°) (if applicable);
- Controlgear efficiency (0-1) (if applicable);
- Lumen maintenance factor;
- Excitation purity (%);
- Correlated colour temperature (K);
- Chromaticity coordinates (x, y);

Note: For light sources with linear geometry which are scalable but of very long length, such as LED strips or strings, verification testing will consider a length of 50 cm, or, if the light source is not scalable there, the nearest value to 50 cm.

The measurements shall be repeated on the same 10 light sources at 3600 hours for final approval. Where a product complies with the LIA Laboratory Energy Related Product Conformity Scheme (see 1.3.4) the data, as specified in Appendix A, will be published.

Results from 0 hour scan will be used on report, as specified in Table 1 and Appendix A (except Lumen maintenance factor, Survival factor and Luminous flux depreciation over test time).

The luminous flux depreciation curve (as specified in Figure 2 of EN 62717). The results of sample with the highest lumen output (after endurance test) will be used as a reference.

Performance requirements for the LED light sources are given in Table 1 below.

Table 1. ***Performance requirements***

Performance Parameter	Limits
Full-load on-mode power P_{on} (W)	
$P_{on} \leq 2W$	The determined value shall not be less than the declared value by more than 0.2W.
$2W < P_{on} \leq 5W$	The determined value shall not be less than the declared value by more than 10%.
$5W < P_{on} \leq 25W$	The determined value shall not be less than the declared value by more than 5%.
$25W < P_{on} \leq 100W$	The determined value shall not be less than the declared value by more than 5%.
$100W < P_{on}$	The determined value shall not be less than the declared value by more than 5%.
Displacement factor (0-1)	The determined value shall not be less than the declared value by more than 0.1 units.
Useful luminous flux Φ_{use} (lm)	The determined value shall not be less than the declared value by more than 10%.
No-load power P_{no}, Standby power, P_{sb} and Networked standby power P_{net} (W)	The determined value shall not be less than the declared value by more than 0.1W.
Colour rendering index CRI (0-100)	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)	The determined value shall not exceed the declared value by more than 10%.
Colour consistency (MacAdam ellips steps)	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 (°)	The determined value shall not deviate from the declared value by more than 25 %.
Lumen maintenance factor(1)	The determined X_{LMF}% of the sample following the test in Annex V of Regulation 2019/2020 (Functionality after endurance testing) shall not be less than $X_{LMF, MIN}$%.
Survival factor	At least 9 light sources of the test sample must be operational after completing the endurance testing.
Excitation purity (%)	The determined value shall not be less than the declared value minus 5 %.
Correlated colour temperature (K)	The determined value shall not deviate from the declared value by more than 10 %.
Chromaticity coordinates (x, y)	The determined value shall not deviate from the declared value

	by more than 10%.
(1) There is no tolerance associated with this metric, as it is a fixed requirement and it is up to the manufacturer to declare an $L_{70}B_{50}$ value to meet it.	

The 0 and 3600 hour lumen value of the LED product shall be plotted in accordance with Figure 2 of EN 62717, a copy of which can be found in Appendix A.

1.5. Packaging Assessment

1.5.1. Not containing product packaging assessment

Packaging of the light source placed on the market, not in a containing product, shall be clearly marked with the following information:

- 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°);
- the correlated colour temperature, rounded to the nearest 100K, also expressed graphically or in words, or the range of correlated colour temperatures that can be set;
- the beam angle in degrees (for directional light sources), or the range of beam angles that can be set;
- electrical interface details, e.g. cap or connector type, type of power supply (e.g. 230 Vac, 50 Hz, 12 Vdc);
- the $L_{70}B_{50}$ lifetime for LED and OLED light sources, expressed in hours;
- the on-mode power (P_{on}), expressed in W;
- 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;
- 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;
- the colour rendering index, rounded to the nearest integer, or the range of CRI values that can be set;
- 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;
- 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;
- 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;
- if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place;
- if the light source is within the scope of Directive 2012/19/EU (or UK SI 2013 No. 3113 – The Waste Electric and Electronic Equipment Regulations 2013), 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 disposed of as unsorted municipal waste.

- If product is designed to operate only if installed on the heatsink, installation instruction provided with the sample shall contain sentence of following substance: '' Suitable heatsink has to be used with the product, or the performance of the product can be affected.''

1.5.2. Containing product packaging assessment

Information about the replaceability or non-replaceability of the light source by end user or qualified person 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.

1.6. Product Critical Components Assessment

For product assessment, the client shall provide LIA Laboratory all relevant information regarding critical components used in the product (e.g. bill of materials, datasheet of critical components, etc.). Examples of critical components are specified below (the list of critical component is not definitive and each product and its components will be considered on case by case basis):

- LED chip;
- LED module PCB;
- Capacitor;
- Resistor;
- Diode;
- Transformer;
- Connector;
- Wiring (internal or external);
- Controlgear,
- Terminal block;
- Etc.

1.7. Product families

Where a particular product has family variants, these may be assessed as groups, but will be considered by LIA Laboratory on a case by case basis.

Where family members have different photometric characteristics (i.e. colour temperature etc.) then the number of samples required for testing shall still comply with 1.3.3 above.

1.8. Surveillance Testing

As part of the ongoing surveillance for certification conformity, LIA Laboratory shall be provided with 2 samples each year for use in limited photometric re-evaluation. 0 hour integrating sphere scan and/or goniophotometer scan (if applicable) will be conducted. There shall not be a difference of more than 10% between the values measured during initial assessment, and values of those from the surveillance assessment.

In addition, verification of critical components will be conducted (to verify for possible changes, see 1.6). In the event a critical component has been changed (e.g. LED chip), an additional assessment may be required. Such cases will be considered separately and additional testing and costs may apply.

2.1. Certification Period

2.1.1 Certification duration and reassessment intervals

Following a successful conformity assessment a certificate will be issued. The certification period will run for three years from the date of issue, assuming that on-going assessment confirms that the products remain in conformity with the scheme. Prior to the end of the three year period, a review shall be undertaken to determine whether it is appropriate to reissue the certificate and commence a new certification cycle of 3 years. The purpose of the review is to assess whether:

- Any of the conformity standards, supporting standards or scheme requirements have been updated since the initial assessment.
- Regulatory requirements, appropriate to the product have changed
- The product range falling under the scope of certification needs to be increased / decreased.
- The products themselves have undergone any changes in design, or composition.
- There have been significant changes to production location or facilities.
- There have been any significant changes to factory production control methods or manufacture processes.

The impact of any such changes on the validity of the initial assessment and hence certification decision shall be assessed.

Where no significant changes are identified, and on-going conformity is assured, then the certificate will be reissued for a further 3 years, subject to the ongoing scheme requirements.

Where significant changes are identified, which affect the validity and scope of the certification, actions necessary to address these changes will be communicated to the client. The certificate may be suspended, or withdrawn until the issues have been addressed satisfactorily. When actions have been completed satisfactorily to bring the certification up to date, then the certification period will recommence for a further three years.

2.1.2 Changes during certification

In addition to the recertification review, it is the responsibility of the client to inform LIA Laboratory of any changes that occur affecting certification as identified in 2.1.1 within the certification period. The impact of any such changes on the validity of the initial assessment and hence certification decision shall be assessed.

Where no significant changes are identified, and on-going conformity is assured, then the certificate will remain valid, subject to the ongoing scheme requirements.

Where significant changes are identified, which affect the validity and scope of the certification, actions necessary to address these changes will be communicated to the client. The certificate may be suspended, or withdrawn until the issues have been addressed satisfactorily.

3.1. Identification and use of the certification logos

All certification logos shall be used in accordance with the LIA Laboratory Logo Usage Policy.

In addition to the identification and marking requirements of relevant standards (as specified in Appendix 2), each product packaging may be marked with the certification mark and certification number.

The marking proposed by the client for each product shall be approved by LIA Laboratory.

The validity of a certificate can be checked directly on the LIA Laboratory's certificates database www.lialabcert.org.uk/certificates-search

3.2. Access to Facilities and Information

Where a complaint is received by LIA Laboratory regarding a product and/or data covered by the scheme, the manufacturer will make available to LIA Laboratory any information, data, samples, access to facilities, personnel and subcontractors in order to investigate such complaints.

On occasion, where a Scheme is covered within the LIA Laboratory' ISO/IEC 17065 schedule of accreditation with UKAS, there may be a need to allow third party access to a manufactures' facilities during the assessment process. It should be noted that the manufacturer will be notified of any such requirement, all information obtained during such visits will remain confidential at all times.

3.3. Impartiality

The latest copy of the LIA Laboratory's impartiality policy along with the Terms & Conditions of this Scheme can be found on:
https://www.thelia.org.uk/page/Impartiality_Policy
https://www.thelia.org.uk/page/Certification_Terms__Conditions

Alternatively a copy can be requested by e-mail at lab@thelia.org.uk.

3.4. Application

An application form for this Scheme can be downloaded from
https://www.thelia.org.uk/page/LIA_PV

Alternatively a copy can be requested by e-mail at lab@thelia.org.uk.

3.5. Additional Information

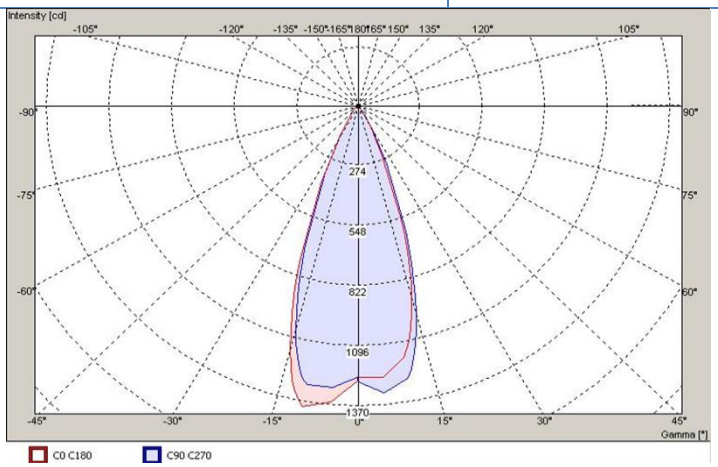
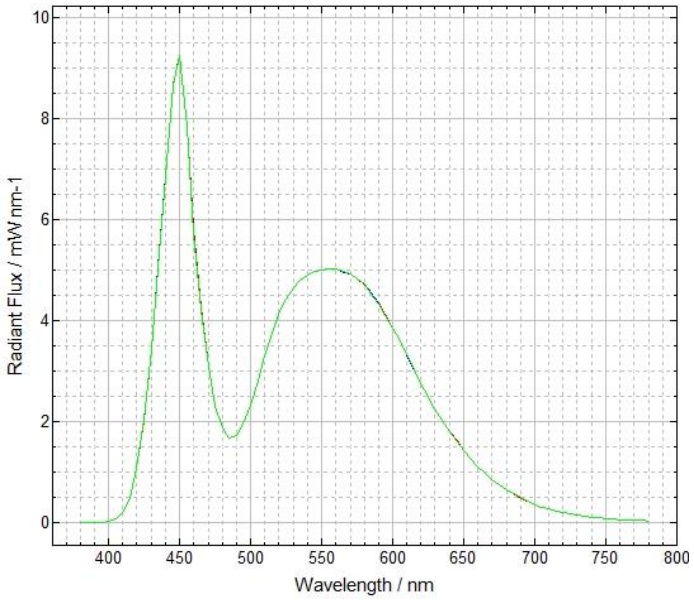
Details of the evaluation procedures, rules and procedures for granting, for maintaining, for extending or reducing the scope of, for suspending and for withdrawing certification can be requested by email at lab@thelia.org.uk.

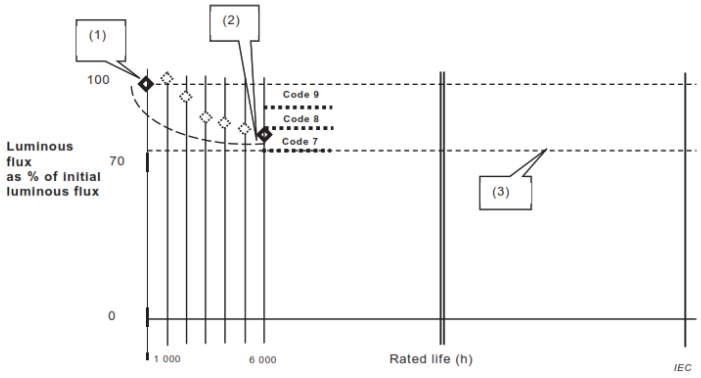
3.6. TSD-002 and TSD-003 Members

Members of the LIA Laboratory TSD-002 and/or TSD-003 schemes may submit goniophotometry and sphere photometry test results for use within the TSD-011 scheme. LIA Laboratory retains the right to perform comparison photometry measurements as seen fit, and to refuse any submitted test results at its discretion.

APPENDIX A

Parameter	Functional requirement	Measured value
Lighting technology used [HL/LFL T5 HE/LFL T5 HO/CFLni/other FL/HPS/MH/other HID/LED/OLED/ mixed/other]		
Non-directional or directional [NDLS/DLS]	'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°)	
Mains or non-mains [MLS/NMLS]	Main Light Source = MLS Non-Mains Light Source = NMLS	
Connected light source (CLS) [yes/no]	Connected via network	
Colour-tuneable light source [yes/no]	Colour can change	
Envelope [no/second/non-clear]	Contains removeable light source	
High luminance light source [yes/no]	Average luminance greater than 30 cd/mm^2 in the direction of peak intensity	
Anti-glare shield [yes/no]	Contains anti-glare shielding	
Dimmable [yes/only with specific dimmers/no]	Dimmable with all or specific dimmers	
Energy consumption in on-mode (kWh/1000 h)	kWh used per 1000 hours	
Energy efficiency class [A/B/C/D/E/F/G] η_{TM} = (Φuse/Pon) × FTM (lm/W)	A: 210 ≤ η_{TM}	
	B: 185 ≤ η_{TM} < 210	
	C: 160 ≤ η_{TM} < 185	
	D: 135 ≤ η_{TM} < 160	
	E: 110 ≤ η_{TM} < 135	
	F: 85 ≤ η_{TM} < 110	
	G: η_{TM} < 85	
Useful luminous flux (Φuse) Indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°)	Flux in a sphere (360°)	
	Flux in a wide cone (120°)	
	Flux in a narrow cone (90°)	
On-mode power (Pon) (W)		
Standby power (Psb), (W)	Rounded to the second decimal	

Networked standby power (P_{net}) for CLS (W)	Rounded to the second decimal	
Beam angle (average) (°)	Average beam angle of all measured planes	
Beam angle (maximum) (°)	Maximum beam angle of all measured planes	
Correlated colour temperature, rounded to the nearest 100 K, or the range of correlated colour temperatures, rounded to the nearest 100 K, that can be set	CCT =	
Colour rendering index, rounded to the nearest integer, or the range of CRI-values that can be set	CRI =	
R9 colour rendering index value		
Spectral power distribution in the range 250 nm to 800 nm, at full-load	 ***Typical example of a Polar Diagram***  ***Typical example of a Spectral flux curve***	
Chromaticity coordinates (x and y)	x =	
	y =	

Colour consistency for LED and OLED light sources. Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.	MacAdam Steps, SDCM =	
Parameter for directional light sources	Peak luminous intensity (cd)	
	Beam angle in degrees, or the range of beam angles that can be set (°)	
Displacement factor (DF, cos φ1) At power input Pon for LED and OLED MLS	No limit at Pon ≤ 5 W	
	DF ≥ 0.5 at 5 W < Pon ≤ 10 W	
	DF ≥ 0.7 at 10 W < Pon ≤ 25 W	
	DF ≥ 0.9 at 25 W < Pon	
Lumen maintenance factor (for LED and OLED)		
Survival factor (for LED and OLED)		
Claims that an LED light source replaces a fluorescent light source without integrated ballast of a particular wattage.		
Flicker for LED and OLED MLS	PstLM value =	
	Ecodesign requirement:	
	Pst LM ≤ 1.0 at full-load	
Stroboscopic effect for LED and OLED MLS	SVM value =	
	Ecodesign requirement: SVM ≤ 0.4 at full-load (except Stroboscopic effect for LED and OLED MLS for HID with Φuse > 4 klm and for light sources intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI < 80)	
Luminous flux depreciation over test time	 **Key** (1) Initial luminous flux (2) Measured luminous flux value at an operational time as stated in 6.1 (3) Lower limit line: claimed flux decrease over rated life L_{70} NOTE The figure is given for illustrative purposes only.	

APPENDIX B – NORMATIVE STANDARDS

Note: Where a standard is referenced the latest valid version of the standard shall be used

CIE 84	The measurement of luminous flux
CIE 121	The photometry and goniophotometry of luminaires
CIE 127	Measurement of LEDs
CIE 13.3	Method of measuring and specifying colour rendering
CIE 1960	Uniform Colour space
IEC 61547	Equipment for general lighting purposes - EMC immunity requirements
IEC TR 61547-1	Equipment for general lighting purposes - EMC immunity requirements - Part 1: Objective light flickermeter and voltage fluctuation immunity test method
IEC TR 63158	Equipment for general lighting purposes - Objective test method for stroboscopic effects of lighting equipment
BS EN 13032-4	Light and lighting – Measurement and presentation of photometric data of lamps and luminaires LED lamps, modules and luminaires
IEC 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50 V - Performance requirements
UK SI 2021 No. 1095	The Ecodesign for Energy-Related Products and Energy Information (Lighting Products) Regulations 2021
2009/125/EC	Ecodesign requirements for directional lamps, light emitting diode lamps and related equipment
EU 2019/2020	Ecodesign requirements for light sources and separate controlgears
EU 2019/2015	Energy labelling of light sources