TEST REPORT Nº MEK-ESH-P21011298
Energy Efficiency Requirements for light sources and separate control gears

Applicant:	Zhejiang MEKA Electric Co., Ltd.
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Attn:	-
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Date of issue:	Oct. 31, 2022
Number of pages:	27

Test item description

Test object:	LED flood light
Trade Mark:	MKOPTO®
Model/Type reference:	12002425-b-X
Rating :	220-240V~, 50Hz, 30W, 130mA
Manufacturer:	Zhejiang MEKA Electric Co., Ltd.
Address:	No.8 Canghai Road, Linhai Town, Binhai New City, Shaoxing, Zhejiang Province, China

Conclusion	**Compliant** with the applicable requirements set out in the regulations and standards mentioned above. This report is full test report.

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Test specifications:.....	☒COMMISSION REGULATION (EU) 2019/2020 of 1 October 2019 laying down ecodesign requirements for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulations (EC) No 244/2009, (EC) No 245/2009 and (EU) No 1194/2012 ☒COMMISSION REGULATION (EU) 2021/341 of 23 February 2021 amending Regulations (EU) 2019/424, (EU) 2019/1781, (EU) 2019/2019, (EU) 2019/2020, (EU) 2019/2021, (EU) 2019/2022, (EU) 2019/2023 and (EU) 2019/2024 with regard to ecodesign requirements for servers and data storage products, electric motors and variable speed drives, refrigerating appliances, light sources and separate control gears, electronic displays, household dishwashers, household washing machines and household washer-dryers and refrigerating appliances with a direct sales function ☒ COMMISSION DELEGATED REGULATION (EU) 2019/2015 of 11 March 2019 supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of light sources and repealing Commission Delegated Regulation (EU) No 874/2012 ☒ COMMISSION DELEGATED REGULATION (EU) 2021/340 of 17 December 2020 amending Delegated Regulations (EU) 2019/2013, (EU) 2019/2014, (EU) 2019/2015, (EU) 2019/2016, (EU) 2019/2017 and (EU) 2019/2018 with regard to energy labelling requirements for electronic displays, household washing machines and household washer-dryers, light sources, refrigerating appliances, household dishwashers, and refrigerating appliances with a direct sales function

LCIE CHINA Arrival Number:	-
Sample size for test:.....	10 pcs
Date of receipt of test item:.....	October 26, 2022
Date of tests:	October 26, 2021 – March 30, 2022

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ANNEX I – Results of measurements

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1. DESCRIPTION OF REFERENCES TESTED

Trademark:	MKOPTO®
Type of product	☐ light sources ☐ separate control gears ☒ containing product
Lighting source	☐ CFL ☐ Halogen ☒ LED ☐ HID ☐ Others
Lighting technology used	☒ MLS ☐ NMLS ☒ DLS ☐ NDLS
Type Reference	12002425-b-X
Rated voltage (In voltage)	220-240V~
Rated frequency (In Hertz)	50Hz
Rated Power (Watts)	30W
Rated lamp life (in hours)	25000
Rated Displacement factor	>0.9
Rated useful luminous flux Φuse [lm]	2510
Rated η T M (lm/W)	98.4
Colour rendering index(CRI)	70
Rated correlated colour temperature [K]	6500
Colour consistency in McAdam ellipses	≤6
Rated beam angle (degrees)	110
Luminous peak intensity [cd]	1260
Flicker metric (Pst LM)	≤1.0
Stroboscopic effect metric (SVM)	-
Survival factor	0.9
Lumen maintenance factor:	96%

Picture:	
View	None
	

2. TEST METHOD AND TEST CONDITIONS FOR MEASUREMENTS

For the purpose of assessing the conformity of the product with the ecodesign requirements as set in COMMISSION REGULATION (EU) 2019/2020 of 1 October 2019 & COMMISSION REGULATION (EU) 2021/341 of 23 February 2021, the following test methods have been used:

Standard reference	Describe
EN 50285:1999	Energy efficiency of electric lamps for household use – Measurement methods
EN 61000-3-2:2019	Electromagnetic compatibility (EMC) Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)
EN 60061-1:1993 All amendments up to A59:2019	Lamp caps and holders together with gauges for the control of interchangeability and safety Part 1:Lamp caps
EN 60064:1995 All amendments up to A5:2009	Tungsten filament lamps for domestric and similar general lighting purposes – Performance requirements
EN 60357: 2003 All amendments up to A11:2016	Tungsten halogen lamps (non-vehicle) – Performance specifications
prEN 60969:2017	Self-ballasted lamps for general lighting services – Performance requirements
CIE 13.3: 1995	Method of Measuring and Specifying Colur Rendering Properties of Light Sources
CIE 15: 2004	Colorimetry
CIE 18.2: 1983	The Basis of Physical Photometry
CIE 84: 1989	The Measurement of Luminous Flux
CIE 97: 2005	Maintenance of indoor electric lighting systems
CIE 154: 2003	The Maintenance of outdoor lighting systems
EN 62612: 2013 All amendments up to A2:2018	Self-ballasted LED-lamps for general lighting services – Performance requirements
IEC 62717:2014 All amendments up to A2:2019	Luminaire performance – Part 1: General requirements
IEC 62722-2-1:2014	Luminaire performance – Part 2-1: Particular requirements for LED luminaires
IEC 62722-1:2014	Luminaire performance – Part 1: General requirements
EN 13032-1:2004 Amendment A1:2012	Light and lighting Measurement and presentation of photometric data of lamps and luminaires Part 1: Measurement and file format
IEC 62471:2006	Photobiological safety of lamps and lamp systems
EN 60968:2015	Self-ballasted lamps for general lighting services
EN 62560:2012 Amendment A11:2019	Self-ballasted LED-lamps for general lighting services by voltage > 50 V – Safety specifications
EN 61341:2011	Method of measurement of centre beam intensity and beam angle(s) of reflector lamps
IEC TR 61547-1:2015	Equipment for general lighting purposes – EMC immunity requirements – Part 1: An objective voltage fluctuation immunity test method
CIE TN 006:2016	Visual Aspects of Time-Modulated Lighting Systems – Definitions and Measurement Models

IEC 62301:2011	Household electrical appliances - Measurement of standby power
EN 13032-4:2015+A1:2019	Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 4: LED lamps, modules and luminaires
IEC TR 63158:2018	Equipment for general lighting purposes - Objective test method for stroboscopic effects of lighting equipment

Possible test case verdicts:	
- Test object does meet the requirement:	P (Pass)
- Test case does not apply to the test object:	N.A (Not applicable)
- Test object does not meet the requirement:	F (Fail)
- Test object does not demand	N.D (Not demanded)

Ambient temperature for test:.....	25±1 °C
Test voltage(s) (V):.....	230 V~
Test Frequency (ies) (Hz):.....	50Hz

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

This report is full test report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information:

The models 12002425-b-Xis LED flood light, 220-240V~, 50Hz, 30W, 130mA, which have different colour enclosure, for outdoor use only.

(EU) 2019/2020			
Section	Requirement Test	Result – Value – Remark	Verdict

3. 3.EVALUCATION – COMMISSION REGULATION (EU) 2019/2020 OF 1 OCTOBER 2019 & COMMISSION REGULATION (EU) 2021/341 OF 23 FEBRUARY 2021

1. ENERGY EFFICIENCY REQUIREMENTS					
(a)	From 1 September 2021, the declared power consumption of a light source Pon shall not exceed the maximum allowed power Ponmax (in W), defined as a function of the declared useful luminous flux Φuse (in lm) and the declared colour rendering index CRI (-) as follows: **$P_{onmax} = C \times (L + \Phi use/(F \times \eta)) \times R$**			30.11W	P
	Efficacy factor (F) is:				P
	1,00 for non-directional light sources (NDLS, using total flux)				NA
	0,85 for directional light sources (DLS, using flux in a cone)				P
	CRI factor (R) is:				P
	0,65 for CRI ⩽ 25				NA
	CRI+80)/160 for CRI > 25, rounded to two decimals				P
	Threshold efficacy (η) and end loss factor (L)				P
	Light source description	η	L		NA
		[lm/W]	[W]		NA
	LFL T5-HE	98,8	1,9		NA
	LFL T5-HO, 4 000 ≤ Φ ≤ 5 000 lm	83,0	1,9		NA
	LFL T5-HO, other lm output	79,0	1,9		NA
	FL T5 circular	79,0	1,9		NA
	FL T8 (including FL T8 U-shaped)	89,7	4,5		NA
	From 1 September 2023, for FL T8 of 2-, 4- and 5-foot	120,0	1,5		NA
	Magnetic induction light source, any length/flux	70,2	2,3		NA
	CFLni	70,2	2,3		NA
	FL T9 circular	71,5	6,2		NA
	HPS single-ended	88,0	50,0		NA
	HPS double-ended	78,0	47,7		NA
	MH ⩽ 405 W single-ended	84,5	7,7		NA
	MH > 405 W single-ended	79,3	12,3		NA
	MH ceramic double-ended	84,5	7,7		NA
	MH quartz double-ended	79,3	12,3		NA
	Organic light-emitting diode (OLED)	65,0	1,5		NA
	Until 1 September 2023: HL G9, G4 and GY6.35	19,5	7,7		NA
	HL R7s ⩽ 2 700 lm	26,0	13,0		NA
	Other light sources in scope not mentioned above (*)For connected light sources (CLS) a factor L = 2,0 shall be applied.	120,0	1,5 (*)		P
	Correction factor C depending on light source characteristics				P
	Light source type				P
	Non-directional (NDLS) not operating on mains (NMLS)	1,00			NA
	Non-directional (NDLS) operating on mains (MLS)	1,08			NA

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	Directional (DLS) not operating on mains (NMLS)	1,15		NA
	Directional (DLS) operating on mains (MLS)	1,23		P
	Special light source feature	Bonus on C		NA
	FL or HID with CCT > 5 000 K	+0,10		NA
	FL with CRI > 90	0,10		NA
	HID with second envelope	+0,10		NA
	MH NDLS > 405 W with non-clear envelope	+0,10		NA
	DLS with anti-glare shield	+0,20		NA
	Colour-tuneable light source (CTLS)	+0,10		NA
	High luminance light sources (HLLS)	+0,0058 • Luminance-HLLS - 0,0167		NA
	The standby power Psb of a light source shall not exceed 0,5 W			NA
	The networked standby power Pnet of a connected light source shall not exceed 0,5 W			NA
(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:**			NA
	Table 3 Minimum energy efficiency for separate control gear at full-load			NA
	Declared output power of the control gear (Pcg) or declared power of the light source (Pls) in W, as applicable	**Minimum energy efficiency**		NA
	Control gear for HL light sources			NA
	all wattages Pcg	0,91		NA
	Control gear for FL light sources			NA
	Pls ⩽ 5	0,71		NA
	5 < Pls ⩽ 100	Pls/(2 × √(Pls/36) + 38/36 × Pls+1)		NA
	100 < Pls	0,91		NA
	Control gear for HID light sources			NA
	Pls ⩽ 30	0,78		NA
	30 < Pls ⩽ 75	0,85		NA
	75 < Pls ⩽ 105	0,87		NA
	105 < Pls ⩽ 405	0,90		NA
	405 < Pls	0,92		NA
	Control gear for LED or OLED light sources			NA
	all wattages Pcg	Pcg0,81/(1,09 × Pcg0,81 + 2,10)		NA
	Multi-wattage separate control gears shall comply with the requirements in Table 3 according to the maximum declared power on which they can operate.			NA

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	The no-load power Pno 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.		NA
	The standby power Psb of a separate control gear shall not exceed 0,5 W.		NA
	The networked standby power Pnet of a connected separate control gear shall not exceed 0,5 W. The allowable values for Psb and Pnet shall not be added together.		NA

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Test item	Requirement Test	Result – Value – Remark	Verdict

2. FUNCTIONALITY REQUIREMENTS			
From 1 September 2021, the functional requirements specified in Table 4 shall apply for light sources:			P
Colour rendering	CRI ⩾ 80 (except 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, when a clear indication to this effect is shown on the light source packaging and in all relevant printed and electronic documentation)		P
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		P
Lumen maintenance factor (for LED and OLED)	The lumen maintenance factor XLMF% after endurance testing according to Annex V shall be at least XLMF,MIN % calculated as follows: XLMF,MIN%=100×e(3000×ln(0.7))L70 where L70 is the declared L70B50 lifetime (in hours) If the calculated value for XLMF,MIN exceeds 96,0 %, an XLMF,MIN value of 96,0 % shall be used		P
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.		P
Colour consistency for LED and OLED light sources	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.		P
Flicker for LED and OLED MLS	Pst LM ⩽ 1,0 at full-load		P
Stroboscopic effect for LED and OLED MLS	SVM ≤ 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 ≤ 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)		P

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3. Information requirements			ND
	From 1 September 2021 the following information requirements shall apply:		ND
(a)	**Information to be displayed on the light source itself**		ND
	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.		ND
	For directional light sources, the beam angle (°) shall also be indicated.		ND
	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.		ND
(b)	**Information to be visibly displayed on the packaging**		ND
(1)	Light source placed on the market, not in a containing product		ND
	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:		ND
(a)	the useful luminous flux (Φuse) in a font at least twice as large as the display of the on-mode power (Pon), clearly indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°);		ND
(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;		ND
(c)	the beam angle in degrees (for directional light sources), or the range of beam angles that can be set;		ND
(d)	electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC);		ND
(e)	the L70B50 lifetime for LED and OLED light sources, expressed in hours;		ND
(f)	the on-mode power (Pon), expressed in W;		ND

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(g)	the standby power (Psb), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging;		ND
(h)	the networked standby power (Pnet) for CLS, expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging;		ND
(i)	the colour rendering index, rounded to the nearest integer, or the range of CRI-values that can be set;		ND
(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 > 4 000 lm, this indication is not mandatory;		ND
(k)	if the light source is designed for optimum use in non-standard conditions (such as ambient temperature Ta ≠ 25 ° C or specific thermal management is necessary): information on those conditions;		ND
(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;		ND
(m)	if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place;		ND
(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 disposed of as unsorted municipal waste.		ND
(2)	Separate control gears:		NA
	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:		NA
(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);		NA
(b)	the type of light source(s) for which it is intended;		NA

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(c)	the efficiency in full-load, expressed in percentage;		NA
(d)	the no-load power (Pno), 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;		NA
(e)	the standby power (Psb), 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;		NA
(f)	where applicable, the networked standby power (Pnet), 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;		NA
(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;		NA
(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.		NA
(c)	**Information to be visibly displayed on a free-access website of the manufacturer, importer or authorised representative**		NA
(1)	Separate control gears:		NA
	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:		NA
(a)	the information specified in point 3(b)(2), except 3(b)(2)(h);		NA
(b)	the outer dimensions in mm;		NA
(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;		NA

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(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;		NA
(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;		NA
(f)	recommendations on how to dispose of it at the end of its life in line with Directive 2012/19/EU.		NA
(d)	**Technical documentation**		NA
(1)	Separate control gears:		NA
	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.		NA
(e)	**Information for products specified in point 3 of Annex III**		NA
	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.		NA
	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.		NA
	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.'		NA

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4. Exemptions			
1.	**This Regulation shall not apply to light sources and separate control gears specifically tested and approved to operate:**		NA
(a)	in potentially explosive atmospheres, as defined in Directive 2014/34/EU of the European Parliament and of the Council (1);		NA
(b)	for emergency use, as set out in Directive 2014/35/EU of the European Parliament and of the Council (2);		NA
(c)	in radiological and nuclear medicine installations that are subject to radiation safety standards as set out in Council Directive 2013/59/EURATOM ;		NA
(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;		NA
(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 (4), (EU) No 167/2013 (5) and (EU) No 168/2013 of the European Parliament and of the Council (6);		NA
(f)	in or on non-road mobile machinery as set out in Regulation (EU) 2016/1628 of the European Parliament and of the Council (7) and in or on their trailers;		NA
(g)	in or on interchangeable equipment as set out in Directive 2006/42/EC of the European Parliament and of the Council (8) 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 is in use on a road by vehicles as set out in Regulation (EU) No 167/2013;		NA
(h)	in or on civil aviation aircraft, as set out in Commission Regulation (EU) No 748/2012 (9);		NA
(i)	in railway vehicle lighting, as set out in Directive 2008/57/EC of the European Parliament and of the Council (10);		NA
(j)	in marine equipment, as set out in Directive 2014/90/EU of the European Parliament and of the Council (11);		NA
(k)	in medical devices, as set out in Council Directive 93/42/EEC (12) or Regulation (EU) 2017/745 of the European Parliament and of the Council (13) and in vitro medical devices as set out in Directive 98/79/EC of the European Parliament and of the Council (14).		NA
2.	**In addition, this Regulation shall not apply to:**		NA
(a)	double-capped fluorescent T5 light sources with power P ≤ 13 W;		NA

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(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 (15), and Commission Regulation (EU) No 617/2013 (16);		NA
(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;		NA
(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;		NA
(e)	light sources and separate control gears on bicycles and other non-motorised vehicles.		NA
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:**		NA
(a)	signalling (including, but not limited to, road-, railway-, marine- or air traffic- signalling, traffic control or airfield lamps);		NA
(b)	image capture and image projection (including, but not limited to, photocopying, printing (directly or in pre-processing), lithography, film and video projection, holography);		NA
(c)	light sources with specific effective ultraviolet power > 2 mW/klm and intended for use in applications requiring high UV-content;		NA
(d)	light sources with a peak radiation around 253,7 nm and intended for germicidal use (destruction of DNA);		NA
(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;		NA
(f)	light sources with the primary purpose of emitting radiation around 185,1 nm and intended to be used for the generation of ozone;		NA

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Section	Requirement Test	Result – Value – Remark	Verdict

(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;		NA
(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;		NA
(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;		NA
(j)	light sources with a photosynthetic efficacy > 1,2 μmol/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;		NA
(k)	HID light sources with correlated colour temperature CCT > 7 000 K and intended for use in applications requiring such a high CCT;		NA
(l)	light sources with a beam angle of less than 10° and intended for spot-lighting applications requiring a very narrow light beam;		NA
(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;		NA
(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:		NA
	Blue: 440nm - 490nm: 90 %		
	Green: 520nm - 570nm: 65 %		
	Red: 610nm - 670nm: 95 %		
	and are intended for use in applications requiring high-quality coloured light;		

(EU) 2019/2020			
Section	Requirement Test	Result – Value – Remark	Verdict
(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);		NA
(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;		NA
(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;		NA
(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;		NA
(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, paints or coatings);		NA
(t)	halogen light sources fulfilling all of the following conditions: R7s cap, CCT ⩽ 2 500 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);		NA
(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;		NA

(EU) 2019/2020			
Section	Requirement Test	Result – Value – Remark	Verdict
(v)	LED or OLED light sources, complying with the definition of 'original works of art' as defined in Directive 2001/84/EC of the European Parliament and of the Council (17), made by the artist him/herself in a limited number below 10 pieces;		NA
(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: (a) LED with power ≥ 100 W and CRI > 90; (b) GES/E40, K39d socket with changeable Colour Temperature down to 1 800 K (undimmed), used with low voltage power supply; (c) LED with power ≥ 180 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 ≥ 100 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.		NA
(x)	incandescent DLS fulfilling all of the following conditions: E27 cap, clear envelope, power ≥ 100 W and ≤ 400 W, CCT ≤ 2 500 K, specifically designed and exclusively marketed for infrared heating		NA
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 (Psb) and on networked standby (Pnet) of points 1(a) and 1(b) of Annex II.		NA
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.		NA

(EU) 2019/2015			
Section	Requirement Test	Result – Value – Remark	Verdict

4. 4.EVALUCATION – COMMISSION DELEGATED REGULATION (EU) 2019/2015 OF 11 MARCH 2019 & COMMISSION DELEGATED REGULATION (EU) 2021/340 OF 17 DECEMBER 2020

5. ENERGY EFFICIENCY CLASSES AND CALCULATION METHOD				
	The energy efficiency class of light sources shall be determined as set out in Table 1, on the basis of the total mains efficacy ηTM, which is calculated by dividing the declared useful luminous flux Φuse (expressed in lm) by the declared on-mode power consumption Pon (expressed in W) and multiplying by the applicable factor FTM of Table 2, as follows: **ηTM = (Φuse/Pon) × FTM (lm/W).**		98.4	P
Table 1	**Energy efficiency classes of light sources**		☐A ☐B ☐C ☐D ☐E ☒F ☐G	P
	Energy efficiency class	Total mains efficacy ηTM (lm/W)		
	A	210 ⩽ ηTM		
	B	185 ⩽ ηTM < 210		
	C	160 ⩽ ηTM < 185		
	D	135 ⩽ ηTM < 160		
	E	110 ⩽ ηTM < 135		
	F	85 ⩽ ηTM < 110		
	G	ηTM < 85		
Table 2	**Factors FTM by light source type**			P
	Light source type	Factor F_{TM}		P
	Non-directional (NDLS) operating on mains (MLS)	1,000		NA
	Non-directional (NDLS) not operating on mains (NMLS)	0,926		NA
	Directional (DLS) operating on mains (MLS)	1,176		P
	Directional (DLS) not operating on mains (NMLS)	1,089		NA
6. **Exemptions**				NA
1.	**This Regulation shall not apply to light sources specifically tested and approved to operate:**			NA
(a)	in radiological and nuclear medicine installations that are subject to radiation safety standards as set out in Council Directive 2013/59/Euratom;			NA
(b)	for emergency use;			NA
(c)	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;			NA
(d)	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 of the European Parliament and of the Council (2), Regulation (EU) No 167/2013 of the European Parliament and of the Council (3) and Regulation (EU) No 168/2013 of the European Parliament and of the Council (4);			NA

(EU) 2019/2015			
Section	Requirement Test	Result – Value – Remark	Verdict
(e)	in or on non-road mobile machinery as set out in Regulation (EU) 2016/1628 of the European Parliament and of the Council (5) and in or on their trailers;		NA
(f)	in or on interchangeable equipment as set out in Directive 2006/42/EC of the European Parliament and of the Council (6) 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 is in use on a road by vehicles as set out in Regulation (EU) No 167/2013;		NA
(g)	in or on civil aviation aircraft as set out in Commission Regulation (EU) No 748/2012 (7);		NA
(h)	in railway vehicle lighting as set out in Directive 2008/57/EC of the European Parliament and of the Council (8);		NA
(i)	in marine equipment as set out in Directive 2014/90/EU of the European Parliament and of the Council (9);		NA
(j)	in medical devices as set out in Council Directive 93/42/EEC (10) or Regulation (EU) 2017/745 of the European Parliament and of the Council (11) and in vitro medical devices as set out in Directive 98/79/EC of the European Parliament and of the Council (12). For the purpose of this point, 'specifically tested and approved' means that the light source: —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.		NA
2.	**In addition, this Regulation shall not apply to:**		NA
(a)	electronic displays (e.g. televisions, computer monitors, notebooks, tablets, mobile phones, e-readers, game consoles), including but not limited to displays within the scope of Commission Regulation (EU) 2019/2021 (13) and of Commission Regulation (EU) No 617/2013 (14);		NA
(b)	light sources in range hoods within the scope of Commission Delegated Regulation (EU) No 65/2014 (15);		NA
(c)	light sources 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;		NA
(d)	light sources on bicycles and other non-motorised vehicles;		NA
(e)	light sources for spectroscopy and photometric applications,		NA

(EU) 2019/2015			
Section	Requirement Test	Result – Value – Remark	Verdict
	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 environmental monitoring.		
3.	**Any light source within the scope of this Delegated Regulation shall be exempt from the requirements of this Regulation, with the exception of the requirements set out in point 4 of Annex V, if it is specifically designed and marketed for its intended use in at least one of the following applications:**		NA
(a)	signalling (including, but not limited to, road-, railway-, marine- or air traffic- signalling, traffic control or airfield lamps);		NA
(b)	image capture and image projection (including, but not limited to, photocopying, printing (directly or in pre-processing), lithography, film and video projection, holography);		NA
(c)	light sources with specific effective ultraviolet power > 2 mW/klm and intended for use in applications requiring high UV-content;		NA
(d)	light sources with a peak radiation around 253,7 nm and intended for germicidal use (destruction of DNA);		NA
(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;		NA
(f)	light sources having the primary purpose to emit radiation around 185,1 nm and intended to be used for the generation of ozone;		NA
(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;		NA
(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;		NA
(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;		NA
(j)	light sources with a photosynthetic efficacy > 1,2 μmol/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;		NA
(k)	LED or OLED light sources, complying with the definition of 'original works of art' as defined in Directive 2001/84/EC of the European Parliament and of the Council (16), made by the artist him/herself in a limited number below 10 pieces.		NA
(l)	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 (e.g.		NA

(EU) 2019/2015			
Section	Requirement Test	Result – Value – Remark	Verdict
	stretch blow-moulding process in PET-Industry, 3D-printing, photovoltaic and electronic manufacturing processes, drying or hardening of adhesives, inks, paints or coatings).		
4.	Light sources specifically designed and exclusively marketed for products in the scope of Commission Regulations (EU) 2019/2023, (EU) 2019/2022, (EU) No 932/2012 and (EU) 2019/2019, shall be exempt from the requirements of points 1(e)(7b), 1(e)(7c) and 1(e)(7d) of Annex VI to this Regulation.		NA

Equipments used for testing

Equipment	Brand	Model
Power Supply	APC	AFC-31010T
Numeric Multimeter	Yokogawa	WT210
Spectroradiometer	Sensing	SUV-3000
AC Power	APC	AFC-500W
Deuterium Lamp Power Source	Sensing	SPR-932D
Sphere	Sensing	SPR-3000
Luxmeter	Sensing	ST-80C
DC Source meter	Sensing	IT6122
Goniophotometeric system	Sensing	GMS-3000
Light source stroboscope tester	Everfine	LFA-3000_V200

ANNEX I – Results of Measurements

Table 1: Initial test results

Sample No.	Test Voltage (V)	Test Current (A)	P_{on} (W)	Displacement factor (DF)	$Ø_{use}$ (lm)	Luminous peak intensity (cd)	Beam angle (°)	CCT (K)	CRI	Flicker (Pst LM)	Stroboscopic effect (SVM)	Colour consistency (SDCM)
1	230	0.13	29.1	0.9879	2670.9	1374.4	108.2	6587	70.4	0.022	-	1.6
2	230	0.13	29.1	0.9879	2596.8	1310.5	108.1	6598	70.5	0.023	-	1.8
3	230	0.13	29.1	0.9878	2643.3	1372.0	105.6	6592	70.5	0.023	-	1.7
4	230	0.13	29.1	0.9879	2606.0	1315.1	108.9	6592	70.4	0.022	-	1.7
5	230	0.13	29.1	0.9879	2596.9	1336.0	105.7	6595	70.5	0.025	-	1.8
6	230	0.13	29.1	0.9879	2661.1	1363.3	107.9	6589	70.4	0.021	-	1.7
7	230	0.13	29.1	0.9879	2592.4	1331.1	108.1	6598	70.5	0.022	-	1.8
8	230	0.13	29.1	0.9879	2642.6	1350.7	105.9	6589	70.4	0.023	-	1.7
9	230	0.13	29.1	0.9878	2591.3	1338.5	107.8	6598	70.5	0.025	-	1.9
10	230	0.13	29.1	0.9878	2656.8	1348.6	107.1	6589	70.4	0.025	-	1.7
Average	230	0.13	29.1	0.9879	2625.8	1344.0	106.8	6592.7	70.5	0.023	-	1.7

Table 2: Test results of No-load power (Pno), Standby power (Psb) and Networked standby power (Pnet)

Sample No.	Separated control gear			Light sources	
	P_{no} (W)	P_{sb} (W)	P_{net} (W)	P_{sb} (W)	P_{net} (W)
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
Average	-	-	-	-	-

Table 3: Test results of energy efficiency for separate control gear at full load

Sample No.	Input Power (W)	Output Power (W)	Calculate efficiency
1	-	-	-
2	-	-	-
3	-	-	-
Average	-	-	-

Table 4: Test results of survival factor and Lumen maintenance

Sample No.	Useful luminous flux Φuse [lm]			Survival factor (for LED and OLED)		Lumen maintenance factor (for LED and OLED)	
	Initial	1800h	3600h	1800h	3600h	1800h	3600h
1	2670.9	-	2581.9	-	100%	-	96.67%
2	2596.8	-	2495.6	-	100%	-	96.10%
3	2643.3	-	2555.8	-	100%	-	96.69%
4	2606.0	-	2499.1	-	100%	-	95.90%
5	2596.9	-	2554.2	-	100%	-	98.36%
6	2661.1	-	2555.9	-	100%	-	96.05%
7	2592.4	-	2509.2	-	100%	-	96.79%
8	2642.6	-	2537.1	-	100%	-	96.01%
9	2591.3	-	2492.7	-	100%	-	96.19%
10	2656.8	-	2551.0	-	100%	-	96.02%
Average	2625.8	-	2533.3	-	100%	-	96.48%

ANNEX II – Energy efficiency classes and calculation method

- **Energy efficiency classes of light sources (according to COMMISSION DELEGATED REGULATION (EU) 2019/2015 of 11 March 2019 & COMMISSION DELEGATED REGULATION (EU) 2021/340 of 17 December 2020):**

According to rated value

Energy efficiency class	F
Total mains efficacy η_{TM} (lm/W)	98.4

According to rated value:

Energy Efficiency Class :	Total mains efficacy η_{TM} (lm/W)
☐Class A	$210 \leqslant \eta_{TM}$
☐Class B	$185 \leqslant \eta_{TM} < 210$
☐Class C	$160 \leqslant \eta_{TM} < 185$
☐Class D	$135 \leqslant \eta_{TM} < 160$
☐Class E	$110 \leqslant \eta_{TM} < 135$
☒Class F	$85 \leqslant \eta_{TM} < 110$
☐Class G	$\eta_{TM} < 85$

According to measured value:

Energy efficiency class	F
Total mains efficacy η_{TM} (lm/W)	106.1

According to measured value:

Energy Efficiency Class :	Total mains efficacy η_{TM} (lm/W)
☐Class A	$210 \leqslant \eta_{TM}$
☐Class B	$185 \leqslant \eta_{TM} < 210$
☐Class C	$160 \leqslant \eta_{TM} < 185$
☐Class D	$135 \leqslant \eta_{TM} < 160$
☐Class E	$110 \leqslant \eta_{TM} < 135$
☒Class F	$85 \leqslant \eta_{TM} < 110$
☐Class G	$\eta_{TM} < 85$