TEST REPORT
PPP 11118C:2021 Rev. 02
TÜV SÜD Test Report for ErP verification of
Ecodesign and Energy labelling requirement for Light Source Implementation measure (EU) 2019/2020 and (EU) 2019/2015

Report No.: Date of issue: Project handler:	70.402.22.186.82-04 2022-09-16 Mr. Yi YUAN
Testing laboratory: Address: Testing location:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No. 151 Hengtong Road, 200070, Shanghai, P.R.China No. 1999, Duhui Road, Shanghai, 201108, P. R. China
Client: Client number: Address: Contact person:	Zhejiang MEKA Electric Co.,Ltd. 080457 No.8 Canghai Road,Lihai Town,Binhai New City 312366 Shaoxing, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA Anson BAO
Standard:	This TÜV SÜD test report form is based on the following requirements: (EU) 2019/2020:2019-10-01 with Corrigendum; (EU) 2019/2015:2019-03-11; (EU) 2021/341:2021-02-23; (EU) 2021/340:2020-12-17
TRF number and revision*:*	PPP 11118C:2021 Rev.02:2021-10
TRF originated by:	TÜV SÜD Product Service, Mr. Richard Xu
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Scheme:	☐ TÜV Mark ☒ without certification ☐ EU-Directive
Non-standard test method: National deviations:	☒ No ☐ Yes, see details under *Summary of testing* N/A
Number of pages *(Report)*: Number of pages *(Attachments)*:	26 N/A

Compiled by: (+ signature)	Mr. YI YUAN	Approved by: (+ signature)	Mr. Tianchen ZHANG

Test sample: Type of test object: Trademark: Model and/ or type reference:	10pcs test samples from manufacturer LED module N/A MK-020011012493 – A(B/C/D/E/F)
Rating(s):	220-240V~, 50/60Hz, 20.0W
Manufacturer: Manufacturer number: Address:	Zhejiang MEKA Electric Co.,Ltd. 080457 No.8 Canghai Road,Lihai Town,Binhai New City 312366 Shaoxing, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA
Name and address of factory(ies) Zhejiang MEKA Electric Co.,Ltd. No.8 Canghai Road,Lihai Town,Binhai New City 312366 Shaoxing, Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA	
Sub-contractors / tests (clause): Name:	N/A N/A
Order description:	☒ Complete test according to TRF ☐ Partial test according to manufacturer's specifications ☐ Preliminary test ☐ Spot check ☐ Others:
Date of order: Date of receipt of test item: Date(s) of performance of test:	2022-09-16 2022-01-05 2022-01-05 to 2022-09-16

Test item particulars:

Light source type:

- Containing product is a light source ☐
- LED (Light Emitting Diode) ☒
- OLED (Organic Light Emitting Diode) ☐
- Incandescent Lamp ☐
- CFL (Compact Fluorescent Lamp) ☐
- CFLni (Compact Fluorescent Lamp without integrated ballast) ☐
- HL (Halogen Lamp) ☐
- FL (Fluorescent Lamp, including circular, U-shape, etc.) ☐
- LFL (Linear Fluorescent Lamp) ☐
- Magnetic induction light source ☐

- HID (High-intensity Discharge lamp, including metal halide, high-pressure sodium and mercury vapour type)	☐
Use of light source:	
- Indoor	☐
- Outdoor	☒
- Industry	☐
Envelope:	
- No	☒
- Second envelope	☐
- Non-clear envelope	☐
Light source characteristic :	
- NDLS (non-directional light source)	☒
- DLS (directional light source)	☐
- MLS (mains light source)	☒
- NMLS (non-mains light source)	☐
- CTLS (colour-tuneable light source)	☐
- CLS (connected light source)	☐
- Dimmable	☐
- Programmable	☐
- With standby mode	☐
- With networked standby mode	☐
- With anti-glare shield	☐
Useful luminous flux (Φ_{use}) type:	
- Narrow cone (90°)	☐
- Wide cone (120°)	☐
- Sphere (360°)	☒
Lamp cap installed:	cord

Purpose of the product (description of intended use):

LED module is intended for general lighting applications and is used as a light source in a LED luminaire (containing product).

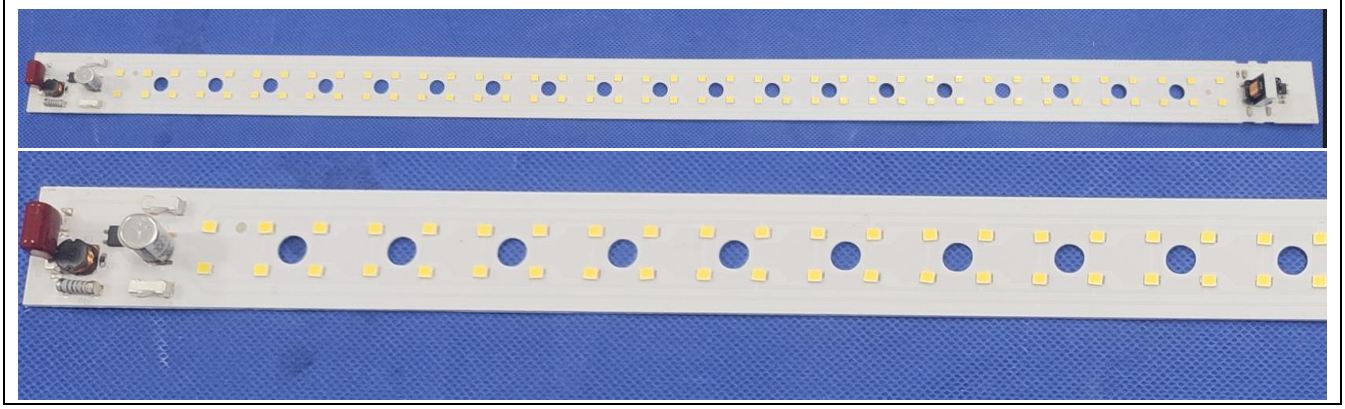
Characteristic data (not shown on the marking plate):

Declared technical data:

Rated voltage ……..…(V):	220-240
Rated current ……..…(mA):	157
Rated power ……..……..…(W):	20.0
Rated useful luminous flux……..……(lm):	2100
Rated beam angle ……...(˚):	N/A
Rated peak intensity……....(cd):	N/A
Rated CCT ……..……..…..(K):	6500
Rated Ra……..……:	80
Rated R9……..……:	0
Rated life time ……..……..(h):	25000
Dimensions (mm):	57.7*2.8
Weight (g):	46.0

Attachments:

1. Photometric test record of one light srouce at initial measurement
2. Test equipment list
3. Test method standards list

If additional information is necessary, please provide N/A
Copy of marking plate: NOT provided
Pictures of the product: 

Summary of testing:

For Ecodesign requirement:

The product meets the energy efficiency, functional & information requirement as specified in EU 2019/2020.

For Energy labelling requirement of EU 2019/2015:

Item	Rated value	Measured value	Deviation	Remark
Beam angle (˚)	-	-	-	-
Φ_{use} (lm)	2100	2184	+4.0%	P
P_{on} (W)	20.00	19.67	-1.7%	P
η_{TM}	105	111	+5.7%	P
Energy efficiency class	F	E	Better Class	P
E_C (kWh/1000h)	20	20	-	P
Remark: measured value in attached table 1.				

Energy efficiency class	Total mains efficacy η_{TM} (lm/W)
A (most efficient)	$210 \leq \eta_{TM}$
B	$185 \leq \eta_{TM} < 210$
C	$160 \leq \eta_{TM} < 185$
D	$135 \leq \eta_{TM} < 160$
E	$110 \leq \eta_{TM} < 135$
F	$85 \leq \eta_{TM} < 110$
G (least efficient)	$\eta_{TM} < 85$

Remarks:

☐ deviation(s) found

☒ no deviations found

Additional information on non-standard test method(s)

Sub clause: N/A

Page: N/A

Rational: N/A

Possible test case verdicts:

test case does not apply to the test object: N/A (not applicable / not included in the order)
test object does meet the requirement: P (Pass)
test object does not meet the requirement: F (Fail)

General remarks:

"(see remark #)" refers to a remark appended to the report.
"(see appended table)" refers to a table appended to the report.
*Throughout this report **a comma/point** is used as the decimal separator.*
The test results presented in this report relate only to the object tested.
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Clause	Requirement + Test	Result – Remark	Verdict
(EU) 2019/2020 - Ecodesign requirement:			
0	Measurement methods		P
	Recognised state of art measurement methods incl. the one published in the Official Journal taking into account the measurement methods of (EU) 2019/2020	See attachment 3	P
1.	Sample		P
	Number of sample used for test ……:	10 light sources	P
2.	Energy efficiency requirements (Annex II, clause 1 of EU 2019/2020)		P
2.1	Maximum allowed power P_{onmax} of light source (Annex II, clause 1, (a) of EU 2019/2020)		P
	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_{on}: 20.0W Φ_{use}: 2100lm $P_{on} \leq P_{onmax}$	P
	$P_{onmax} = C \times (L + \Phi_{use}/(F \times \eta)) \times R$	P_{onmax}: 20.52W	P
	where:		P
	-The values for threshold efficacy (η in lm/W) and end loss factor (L in W) are specified in Table 1 of EU 2019/2020, 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	η : 120 L: 1.5	P

Clause	Requirement + Test	Result – Remark	Verdict
	Table 1 of EU 2019/2020 Threshold efficacy (ɳ) and end loss factor (L)		-

Light source description	ɳ	L
	[lm/W]	[W]
LFL T5-HE	98,8	1,9
LFL T5-HO, 4 000 ⩽ Φ ⩽ 5 000 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 ⩽ 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 ⩽ 2 700 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.		

	-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 of EU 2019/2020	C: 1.08	P

Clause	Requirement + Test	Result – Remark	Verdict
	Table 2 of EU 2019/2020 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 > 5 000 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 • Luminance-HLLS - 0,0167

	Where applicable, bonuses on correction factor C are cumulative		N/A
	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)		N/A
	-Efficacy factor (F) is:		P
	1,00 for non-directional light sources (NDLS, using total flux)	F: 1.0	P
	0,85 for directional light sources (DLS, using flux in a cone)	F:	N/A
	–CRI factor (R) is:		P
	0,65 for CRI ⩽ 25	R:	N/A
	(CRI+80)/160 for CRI > 25, rounded to two decimals	R: 1.00	P
	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		P

Clause	Requirement + Test	Result – Remark	Verdict
	correlated colour temperature (CCT), and/or changing the directional/non-directional status of the light source, shall be evaluated using the reference control settings.		
	Standby power P_{sb} and networked standby power P_{net} of light source		N/A
	The standby power P_{sb} of a light source shall not exceed 0,5 W	P_{sb}:	N/A
	The networked standby power P_{net} of a connected light source shall not exceed 0,5 W	P_{net}:	N/A
	The allowable values for P_{sb} and P_{net} shall not be added together		N/A
	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		N/A
3	Functional requirements (Annex II, clause 2 of EU 2019/2020)		P
	From 1 September 2021, the functional requirements should apply for **light sources** (Annex II, clause 2, table 4 of EU 2019/2020)		P
3.1	Colour rendering		P
	CRI ≥ 80	CRI: see attached table 1	P
	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	CRI:	N/A
3.2	Displacement factor (DF, cos φ_1) at power input P_{on} for LED and OLED MLS		P
	No limit at $P_{on} \leq 5$ W	P_{on}:	N/A
	DF ≥ 0,5 at 5 W < $P_{on} \leq$ 10 W	P_{on}: DF:	N/A
	DF ≥ 0,7 at 10 W < $P_{on} \leq$ 25 W	P_{on}: 20.0W DF: see attached table 1	P
	DF ≥ 0,9 at 25 W < P_{on}	P_{on}:	N/A

Clause	Requirement + Test	Result – Remark	Verdict
		DF:	
3.3	Lumen maintenance factor (for LED and OLED)		P
	The lumen maintenance factor X_{LMF}% after endurance testing shall be at least $X_{LMF,MIN}$ % calculated as follows		P
	$X_{LMF,MIN}\% = 100 \times e^{\frac{(3000 \times \ln(0.7))}{L_{70}}}$ where L_{70} is the declared $L_{70}B_{50}$ lifetime (in hours)	L_{70}: 25000 $X_{LMF,MIN}$ %: 95.8 X_{LMF}%: see attached table 1	P
	If the calculated value for $X_{LMF,MIN}$ exceeds 96,0 %, an $X_{LMF,MIN}$ value of 96,0 % shall be used	L_{70}: $X_{LMF,MIN}$%=96,0% X_{LMF}%:	N/A
3.4	Survival factor (SF) (for LED and OLED)		P
	At least 9 light sources of the 10 test samples must be operational after completing the endurance testing	10 light sources are operational after endurance testing	P
3.5	Colour consistency for LED and OLED light sources		P
	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.	see attached table 1	P
3.6	Flicker for LED and OLED MLS		P
	P_{st} LM ≤ 1,0 at full-load	see attached table 1	P
3.7	Stroboscopic effect for LED and OLED MLS		P
	SVM ≤ 0,9 at full-load		N/A
	From 1 September 2024: SVM ≤ 0,4 at full-load		N/A
	except for light sources intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI < 80	Outdoor applications	P
4	Information requirements (Annex II, clause 3 of EU 2019/2020)		P
	From 1 September 2021 the following information requirements shall apply:		P
4.1	Information to be displayed on the light source itself		P
	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		P
	For directional light sources, the beam angle (°) shall also be indicated		N/A

Clause	Requirement + Test	Result – Remark	Verdict
	If there is room for only two values, the useful luminous flux and the correlated colour temperature shall be displayed		N/A
	If there is room for only one value, the useful luminous flux shall be displayed		N/A
4.2	Information to be visibly displayed on the packaging		N/A
4.2.1	Light source placed on the market, not in a containing product		N/A
	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:		N/A
(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°)		N/A
(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		N/A
(c)	the beam angle in degrees (for directional light sources), or the range of beam angles that can be set		N/A
(d)	electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC)		N/A
(e)	the $L_{70}B_{50}$ lifetime for LED and OLED light sources, expressed in hours		N/A
(f)	the on-mode power (P_{on}), expressed in W		N/A
(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		N/A
(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		N/A
(i)	the colour rendering index, rounded to the nearest integer, or the range of CRI-values that can be set		N/A
(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		N/A
(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		N/A

Clause	Requirement + Test	Result – Remark	Verdict
(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		N/A
(m)	if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place		N/A
(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		N/A
	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		N/A
	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		N/A
	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		N/A
5	Removal of light sources and separate control gears (Article 4 of EU 2019/2020)		P
5.1	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		P
	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		P
5.2	Manufacturers, importers or authorized 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.		P

Clause	Requirement + Test	Result – Remark	Verdict
	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		
5.3	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		P
6	Circumvention (Article 7 of EU 2019/2020)		P
	The manufacturer, importer or authorised representative shall not place on the market products designed to be able to detect they are being tested (e.g. 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 declared by the manufacturer, importer or authorised representative in the technical documentation or included in any of the documentation provided.		P
	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.		P
	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.		P

Clause	Requirement + Test	Result – Remark	Verdict

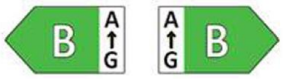
(EU) 2019/2015 - Energy labelling requirement:			
6	Measurment methods		P
	Recognised state of art measurement methods incl. the one published in the Official Journal taking into account the measurement methods of EU 2019/2015	See attachment 3	P
7	Method for calculating the total mains efficacy (Annex II, EU 2019/2015)		P
7.1	Calculation the total mains efficacy		P
	The energy efficiency class of light sources shall be determined as set out in Annex II, Table 1 of EU 2020/2015		P
	on the basis of the total mains efficacy η_{TM}, which is calculated by dividing the declared useful luminous flux Φ_{use} (expressed in lm) by the declared on mode power consumption P_{on} (expressed in W) and multiplying by the applicable factor F_{TM} of Annex II, Table 2 of EU 2019/2015 as follow: $\eta_{TM} = (\Phi_{use}/P_{on}) \times F_{TM}$ (lm/W)		P
	declared useful luminous flux Φ_{use} (expressed in lm)		P
	declared on mode power consumption P_{on} (expressed in W)		P
	applicable factor F_{TM} of Annex II, Table 2 of EU 2019/2015		-
	Factors F_{TM} by light source type (Table 2 of Annex II, EU 2019/2015)		-
	Light source type / Factor F_{TM}		-
	Non-directional (NDLS) operating on mains (MLS) / 1,000		P
	Non-directional (NDLS) not operating on mains (NMLS) / 0,926		N/A
	Directional (DLS) operating on mains (MLS) / 1,176		N/A
	Directional (DLS) not operating on mains (NMLS) / 1,089		N/A
7.2	CALCULATION OF THE ENERGY CONSUMPTION		P
	The weighted energy consumption (Ec) is calculated in kWh/1000 h as follows and is rounded to two decimal places: $Ec=P_{on} \times 1000h/1000$		P
8	Evaluation		P

Clause	Requirement + Test	Result – Remark	Verdict
	Declared values are not more favorable then value based on measured data		P
9	Product information (Annex V of EU 2019/2015)		P
9.1	Product information sheet	Optional: Manufatcurer can declare based on a draft	P
9.1.1	Pursuant to point 1(b) of Article 3, the supplier shall enter into the product database the information as set out in Annex V, Table 3, including when the light source is a part in a containing product		P
	For light sources that can be tuned to emit light at full-load with different characteristics, the values of parameters that vary with these characteristics shall be reported at the reference control settings		P
	If the light source is no longer placed on the EU market, the supplier shall put in the product database the date (month, year) when the placing on the EU market stopped		N/A
9.2	Information to be displayed in the documentation for a containing product		P
	If a light source is placed on the market as a part in a containing product, the technical documentation for the containing product shall clearly identify the contained light source(s), including the energy efficiency class		P
	If a light source is placed on the market as a part in a containing product, the following text shall be displayed, clearly legible, in the user manual or booklet of instructions:		P
	'This product contains a light source of energy efficiency class <X>'		P
	where <X> shall be replaced by the energy efficiency class of the contained light source		P
	If the product contains more than one light source, the sentence can be in the plural, or repeated per light source, as suitable		N/A
9.3	Information to be displayed on the supplier' s free access website	Optional: Manufatcurer can declare based on a draft	P
(a)	The reference control settings, and instructions on how they can be implemented, where applicable		P
(b)	Instructions on how to remove lighting control parts and/or non-lighting parts, if any, or how to switch them off or minimize their power consumption		N/A
(c)	If the light source is dimmable: a list of dimmers it is compatible with, and the light source — dimmer compatibility standard(s) it is compliant with, if any		N/A
(d)	If the light source contains mercury: instructions on how to clean up the debris in case of accidental breakage		N/A

Clause	Requirement + Test	Result – Remark	Verdict
(e)	Recommendations on how to dispose of the light source at the end of its life in line with Directive 2012/19/EU of the European Parliament and of the Council		P
9.4	Information for products specified in point 3 of Annex IV		N/A
	For the light sources specified in point 3 of Annex IV, their intended use shall be stated on all forms of packaging, product information and advertisement, together with a clear indication that the light source is not intended for use in other applications		N/A
	The technical documentation file drawn up for the purposes of conformity assessment, in accordance with paragraph 3 of Article 3 of Regulation (EU) 2017/1369 shall list the technical parameters that make the product design specific to qualify for the exemption		N/A
10	Technical documentation (Annex VI of EU 2019/2015)		P
10.1	The technical documentation referred to in point 1(d) of Article 3 shall include:	Optional: Manufatcurer can declare his intention based on a draft	P
(a)	the name and address of the supplier		P
(b)	supplier’s model identifier		P
(c)	the model identifier of all equivalent models already placed on the market		P
(d)	identification and signature of the person empowered to bind the supplier		P
(e)	the declared values for the following technical parameters; these values are considered as the declared values for the purpose of the verification procedure in Annex IX		P
(1)	useful luminous flux (Φ_{use}) in lm		P
(2)	colour rendering index (CRI)		P
(3)	on-mode power (P_{on}) in W		P
(4)	beam angle in degrees for directional light sources (DLS)		P
(4a)	peak luminous intensity in cd for directional light sources (DLS)		P
(5)	correlated colour temperature (CCT) in K		P
(6)	standby power (P_{sb}) in W, including when it is zero		P
(7)	networked standby power (P_{net}) in W for connected light sources (CLS)		N/A
(7a)	R9 colour rendering index value for LED and OLED light sources		P
(7b)	survival factor for LED and OLED light sources		P
(7c)	lumen maintenance factor for LED and OLED light sources		P
(7d)	indicative lifetime L70B50 for LED and OLED light sources		P

Clause	Requirement + Test	Result – Remark	Verdict
(8)	displacement factor (cos Φ 1) for LED and OLED mains light sources		P
(9)	colour consistency in MacAdam ellipse steps for LED and OLED light sources		P
(10)	luminance-HLLS in cd/mm^2 (only for HLLS)		N/A
(11)	flicker metric (P_{st}LM) for LED and OLED light sources		P
(12)	stroboscopic effect metric (SVM) for LED and OLED light sources		N/A
(13)	excitation purity, only for CTLS, for the following colours and dominant wavelength within the given range		N/A
	Colour Dominant wave-length range		N/A
	Blue 440 nm — 490 nm		N/A
	Green 520 nm — 570 nm		N/A
	Red 610 nm — 670 nm		N/A
(f)	the calculations performed with the parameters, including the determination of the energy efficiency class		P
(g)	references to the harmonised standards applied or other standards used		P
(h)	testing conditions if not described sufficiently in point (g)		N/A
(i)	the reference control settings, and instructions on how they can be implemented, where applicable		P
(j)	instructions on how to remove lighting control parts and/or non-lighting parts, if any, or how to switch them off or minimise their power consumption during light source testing		N/A
(k)	specific precautions that shall be taken when the model is assembled, installed, maintained or tested		P
10.2	The elements listed under point 1 shall also constitute the mandatory specific parts of the technical documentation that the supplier shall enter into the database, pursuant to point 5 of Article 12 of Regulation (EU) 2017/1369		P
11	Information to be provided in visual advertisements, in technical promotional material and in distance selling, except distance selling on the internet (Annex VII of EU 2019/2015)		N/A
11.1	In visual advertisements, for the purposes of ensuring conformity with the requirements laid down in point 1(e) of Article 3 and point 1(c) of Article 4, the energy class and the range of efficiency classes available on the label shall be shown as set out in point 4 of this Annex	Optional: Manufatcurer can declare based on a draft	N/A

Clause	Requirement + Test	Result – Remark	Verdict
11.2	In technical promotional material, for the purposes of ensuring conformity with the requirements laid down in point 1(f) of Article 3 and point 1(d) of Article 4, the energy class and the range of efficiency classes available on the label shall be shown as set out in point 4 of this Annex		N/A
11.3	Any paper-based distance selling must show the energy class and the range of efficiency classes available on the label as set out in point 4 of this Annex		N/A
11.4	The energy efficiency class and the range of energy efficiency classes shall be shown, as indicated in Figure 2, with		N/A
(a)	an arrow, containing the letter of the energy efficiency class in 100 % white, Calibri Bold and in a font size at least equivalent to that of the price, when the price is shown		N/A
(b)	the colour of the arrow matching the colour of the energy efficiency class		N/A
(c)	the range of available energy efficiency classes in 100 % black; and		N/A
(d)	the size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a border of 0,5 pt in 100 % black placed around the arrow and the letter of the energy efficiency class By way of derogation, if the visual advertisement, technical promotional material or paper-based distance selling is printed in monochrome, the arrow can be in monochrome in that visual advertisement, technical promotional material or paper-based distance selling *Figure 2* **Coloured/monochrome left/right arrow, with range of energy efficiency classes indicated** 		N/A
11.5	Telemarketing-based distance selling must specifically inform the customer of the energy efficiency class of the product and of the range of energy efficiency classes available on the label, and that the customer can access the full label and the product information sheet through a free access website, or by requesting a printed copy	Optional: Manufatcurer can declare based on a draft	N/A
11.6	For all the situations mentioned in points 1 to 3 and 5, it must be possible for the customer to access the label and the product information sheet through a link to the product database website, or to request a printed copy		N/A
12	Information to be provided in the case of distance selling on the internet (Annex VIII of EU 2019/2015)		N/A

Clause	Requirement + Test	Result – Remark	Verdict
12.1	The appropriate label made available by suppliers in accordance with point 1(g) Article 3 shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the label is clearly visible and legible and shall be proportionate to the size specified for the standard label in Annex III	Optional: Manufatcurer can declare based on a draft	N/A
	The label may be displayed using a nested display, in which case the image used for accessing the label shall comply with the specifications laid down in point 3 of this Annex. If nested display is applied, the label shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the image		N/A
12.2	The image used for accessing the label in the case of nested display, as indicated in Figure 3, shall		N/A
(a)	be an arrow in the colour corresponding to the energy efficiency class of the product on the label		N/A
(b)	indicate the energy efficiency class of the product on the arrow in 100 % white, Calibri Bold and in a font size equivalent to that of the price		N/A
(c)	have the range of available energy efficiency classes in 100 % black; and		N/A
(d)	have one of the following two formats, and its size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a visible border in 100 % black placed around the arrow and the letter of the energy efficiency class: *Figure 3* **Coloured left/right arrow, with range of energy efficiency classes indicated** 		N/A
12.3	In the case of nested display, the sequence of display of the label shall be as follows		N/A
(a)	the image referred to in point 2 of this Annex shall be shown on the display mechanism in proximity to the price of the product		N/A
(b)	the image shall link to the label set out in Annex III		N/A
(c)	the label shall be displayed after a mouse click, mouse roll-over or tactile screen expansion on the image		N/A
(d)	the label shall be displayed by pop up, new tab, new page or inset screen display		N/A
(e)	for magnification of the label on tactile screens, the device conventions for tactile magnification shall apply		N/A
(f)	the label shall cease to be displayed by means of a close option or other standard-closing mechanism		N/A

Clause	Requirement + Test	Result – Remark	Verdict
(g)	the alternative text for the graphic, to be displayed upon failure to display the label, shall be the energy efficiency class of the product in a font size equivalent to that of the price		N/A
12.4	The appropriate product information sheet made available by suppliers in accordance with point 1(h) of Article 3 shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the product information sheet is clearly visible and legible. The product information sheet may be displayed using a nested display or by referring to the product database, in which case the link used for accessing the product information sheet shall clearly and legibly indicate ‘Product information sheet’. If nested display is used, the product information sheet shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the link		N/A

Table 1	**Test data for 50cm length**											
Voltage (V):		**230V~**			**Frequency (Hz):**			**50**				
Φ_{use} measured at:		sphere (360°)			**Ambient (T/rh) (°C / %)**			**25/55**				
Test item	**Measured Value**										**Average**	**Limit**
Sample:	1	2	3	4	5	6	7	8	9	10	-	-
U (V) [1)]	230	230	230	230	230	230	230	230	230	230	230	-
I (mA) [1)]	158	157	158	157	158	157	157	157	157	157	157	-
P (W) [1)]	19.76	19.68	19.67	19.66	19.66	19.66	19.65	19.64	19.64	19.64	19.67	≤ 20.0
DF (cos φ_1) [1)2)7)]	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	≥ 0.7
Φ_{use} (lm) [1)]	2224	2174	2199	2170	2194	2167	2191	2166	2188	2164	2184	≥ 2100
CCT (K) [1)]	6182	6196	6199	6201	6223	6223	6223	6230	6230	6230	6214	-
CRI [1)2)]	83	83	83	83	83	83	83	84	84	84	83	≥ 80 [3)]
Color consistency [1)2)]	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	≤ 6-step
R9[1)4)]	10	10	10	10	10	10	10	10	10	10	10	-
SF @ 3600h [2)5)8)]	S	S	S	S	S	S	S	S	S	S	SF:100%	≥90%
Φ_{use}, @ 3600h[8)] (lm)	2134	2084	2111	2086	2109	2097	2106	2090	2106	2076	2100	-
X_{LMF} @ 3600h [2) 8)6)]	96.0	95.9	96.0	96.1	96.1	96.8	96.1	96.5	96.2	95.9	96.2	≥ 95.8
Flicker (P_{st} LM) [1)2)]	0.034	0.032	0.034	0.035	0.033	0.034	0.034	0.033	0.035	0.034	0.034	P_{st} LM ≤ 1,0 at full-load
Stroboscopic effect (SVM) [1)2)]	-	-	-	-	-	-	-	-	-	-	-	SVM ≤ 0,9 at full-load From 1 September 2024:

												SVM ≤ 0,4 at full-load [3]
P_{sb} (W)[1) 9)]	-	-	-	-	-	-	-	-	-	-	-	⩽0.5
P_{net} (W)[1) 10)]	-	-	-	-	-	-	-	-	-	-	-	⩽0.5
Beam angle (°)	-	-	-	-	-	-	-	-	-	-	-	-
Peak intensity (cd)	-	-	-	-	-	-	-	-	-	-	-	-

Supplementary information:

1) initial measurement value after aging of: 30 min

2) for LED and OLED

3) 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

4) means the colour rendering index for a red coloured object as defined in standards

5) '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

6) '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

7) 'displacement factor (DF) (cos φ_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

8) '3600h' referes to (EU)2019/2020 Annex V, the total test time is 3600h (1200 cycle of 150min 'ON' and 30min 'OFF'), the actual operation time is 3000h; UT = under test

9) '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

10) 'networked standby power' (P_{net}), expressed in watt, is the electric power consumption of a CLS or of a CSCG in networked standby mode

Additional measurement

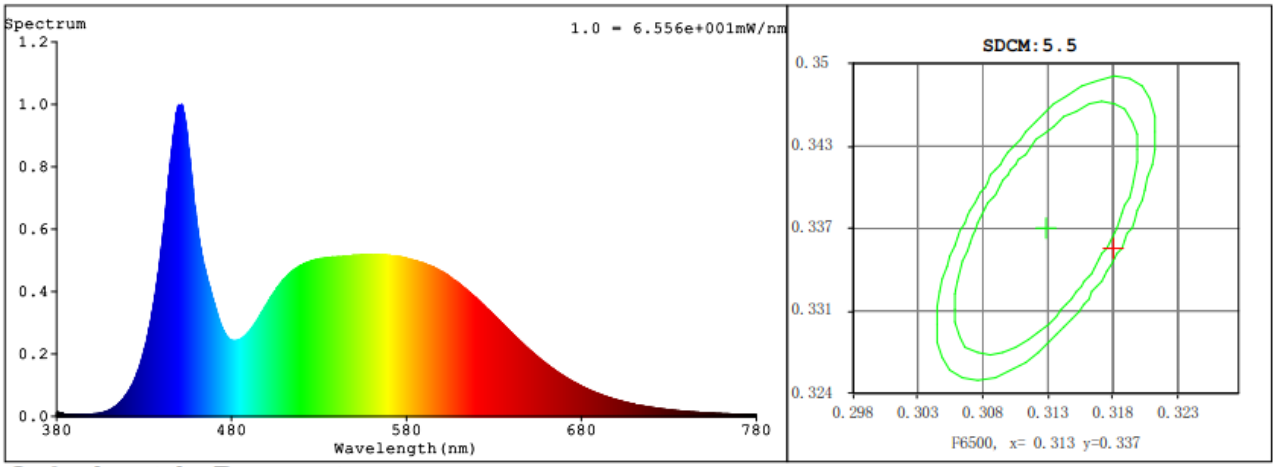
Chromaticity coordinates (x,y) 1):0.3182,0.3355

Measured beam angle (˚): N/A

Peak intensity (cd) 1): N/A

Φ_{use} @90° (lm) : N/A

Attachment 1: Photometric test record



Colorimetric Parameters

Chromaticity Coordinate: x = 0.3182 y = 0.3355 / u' = 0.1992 v' = 0.4726 (duv=3.80e-03)

CCT= 6182K Prcp WL: Ld=493.5nm Purity=5.0%

Peak WL: Lp=452nm FWHM: =24.6nm Ratio:R=13.8% G=81.0% B=5.2%

Render Index: Ra = 83.2 AvgR = 76.1

EEI: 0.12102 A+

R1 =81	R2 =87	R3 =90	R4 =84	R5 =83	R6 =82	R7 =88	
R8 =71	R9 =10	R10=68	R11=83	R12=61	R13=83	R14=95	R15=77

Photometric & Radiometric Parameters

Flux = 2224.2 lm Eff. : 112.56 lm/W Fe = 7.1576 W

Electrical parameters

V = 231.02 V I = 0.1581 A P = 19.76 W PF = 0.5409 F=49.99 Hz

Kdisp(IEC) = 0.8171

Attachment 2: Equipment List

No.	Type	Manufacture	Model	Equipment ID	Next Calibration
1184	Digital Power Meter	YOKOGAWA (Japan)	WT310E-C2-H/G5	S18101184-YQ	2023-06-01
1240	High Accuracy Array Spectroradio Meter	Everfine	HAAS-2000_VIR3510	S18121240-YQ	2023-06-01
525	Reference Lamp	Sensing	0.8422A (110V 100W)	S1004525-YQ	2023-06-01
415	Thermometer	Fluke (USA)	Fluke 52-II	S0712415-YQ	2023-06-01
714	Full-field Speed Goniophotometer	Everfine	GO-R5000	S1207714-YQ	2023-06-01
714a	High-accuracy Intelligent Photometer Head	Everfine	ID-1000_P-B/ID-1000_P-C	S1207714a-YQ	2023-06-01
714b	High-accuracy Digital Photometer Head	Everfine	ID-1000_P-B/ID-1000_P-C	S1207714b-YQ	2023-06-01
714c	High Accuracy Array Spectroradio Meter	Everfine	HAAS-2000	S1207714c-YQ	2023-06-01
714d	Standard Light Source	Everfine	D908	S1207714d-YQ	2023-06-01
714e	Digital Power Meter	Everfine	PF2010	S1207714e-YQ	2023-06-01
714f	Digital CC & CV DC Power Supply	Everfine	WY12010	S1207714f-YQ	2023-06-01
714g	Intelligent AC Power Source	Everfine	DPS1060	S1207714g-YQ	2023-06-01
1080	Light Flickering Analyzer	Everfine	LFA-3000	S17041080-YQ	2023-06-01
1036	Precision Digital Power Meter	YOKOGAWA (Japan)	WT3001E-2A1-30A0-H/G6	S16111036-YQ	2023-06-01

Attachment 3: Test method standards list

Light source type	Reference standards
☒ LED lamp	☒ EN 62612:2013+A1:2017+A11:2017+A2:2018 ☒ EN 13032-4:2015+A1:2019 ☒ IEC TR 63158:2018 ☒ IEC TR 61547-1:2020 ☐ EN IEC 63103:2020 ☒ EU 2019/2020 Annex V
☐ LED module	☐ EN 62717:2017+A2:2019 ☐ EN 13032-4:2015+A1:2019 ☐ IEC TR 63158:2018 ☐ IEC TR 61547-1:2020 ☐ EN IEC 63103:2020 ☐ EU 2019/2020 Annex V
☐ CFL	☐ EN 60969:1993+A1:1993+A2:2000 ☐ EN 13032-1:2004+A1:2012 ☐ EN IEC 63103:2020 ☐ EU 2019/2020 Annex V
☐ Halogen lamp	☐ EN 60357:2003+A1:2008+A2:2008+A3:2011+A11:2016 ☐ EN 13032-1:2004+A1:2012 ☐ EN IEC 63103:2020 ☐ EU 2019/2020 Annex V

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