TEST REPORT

Ecodesign requirements for light sources and separate control gears

Report number:	RGT2024071701001
Issue date:	2024-07-22
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Testing laboratory name:	Ring Testing Technology (zhongshan) Co., Ltd
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Test by (+ signature):	Jason Fang Jason Fang
Approved by (+ signature):	Red Fan Red Fan
Applicant's name:	Hangzhou Tiger Electron& Electric Co., Ltd.
Applicant's address:	NO.15 xingfa Rd., xingqiao town, liping district, hangzhou, P.R. China
Test item description	
Product category:	LED Down Light
Trade mark:	NA
Model reference:	See model list on page 5
Rating:	See model list on page 5
Manufacturer's name:	Same as applicant
Address:	Same as applicant
Country of manufacturing:	China
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
Conclusion	**Compliant** with the applicable requirements set out in the regulations and standards mentioned above.

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Summary of testing:			
Samples size for test:	10pcs/model	Date of receipt of test item:	2024-02-16
Date of tests:	2024-02-16 ~ 2024-07-12	Ambient temperature for test:(°C)	25±1
Factory's name:	Same as applicant		
Factory's address and testing place:	Same as applicant		
Remark: These tests fulfil the requirements of standard ISO/IEC 17025. When determining the test conclusion, the Measurement Uncertainty of test has been considered.			

Summary of report:	
Index of contents:	
1. Description of reference tested and product information	
2. Reference standard	
3. Evaluation	
4. Equipment used for testing	
Annex I – Results of measurements	
Appendix II: Product information sheet	
Annex III –Information Requirements	
ANNEX IV: Product information	
Annex V –Making, packing and instruction	
Annex VI –Photos of Tested Samples	
Possible test case verdicts:	
Test object does meet the requirement:	P (Pass)
Test case does not apply to the test object:	NA (Not applicable)
Test object does not meet the requirement:	F (Fail)
Test object does not demand	ND (Not demanded)
General remarks:	

"(See remark #)" refers to a remark appended to the report.

Throughout this report a point is used as the decimal separator.

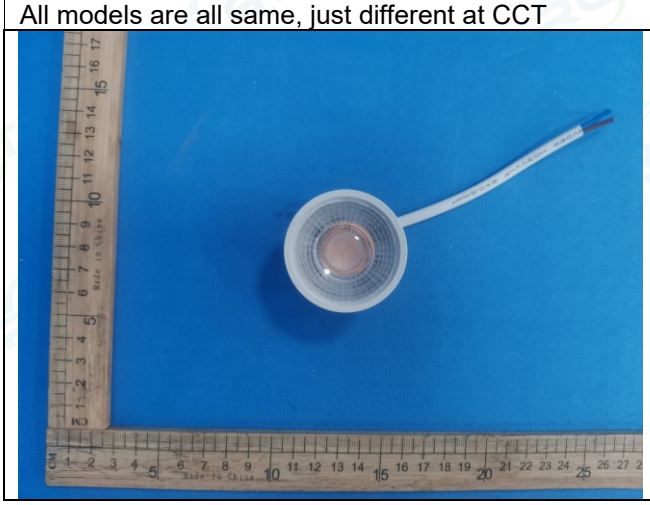
The test results presented in this report relate only to the object tested.
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This report is a full test report. In this report, the test samples are provided by client and do the test at factory, the test results only apply to the samples and test data as received in this report.

1. DESCRIPTION OF REFERENCES TESTED

Lighting source:	☒ Direct ☐ Indirect ☐ Colour-tuneable light source ☐ Connected light source (CLS) ☐ High luminance light source
Technology:	☒ LED (Light Emitting Diode) ☐ OLED (Organic Light Emitting Diode) ☐ Incandescent lamp ☐ CFL ☐ CFLni ☐ HL (Halogen lamp) ☐ FL (Fluorescent lamp) ☐ LFL (Liner Fluorescent lamp) ☐ Magnetic induction light source ☐ HID ☐ Control gear
Control gear:	☒ Internal ☐ External ☐ None
Use environment:	☒ Indoor ☐ Outdoor ☐ Industry
Other properties of the Product:	☐ Clear Lamp ☐ Second Envelope ☐ Anti-Glare Shield ☒ None
Type of Ballast / Control Gear	☐ Dimming ☒ Non-dimming
Connected light source (CLS):	☐ Yes ☒ No
Type and size of cap:	NA
Containing product:	☐ Containing product with non-separateable light source(s) or/and control gear(s) ☐ Containing product with separateable light source(s) or/and control gear(s)
Declared technical data:	
Model name:	
Rated current (mA)/Rate Voltage(V) & rate frequency (Hz):	220-240V~,50/60Hz
Rated lamp power (W) Pon:	9W
Rated useful luminous flux (lm):	660lm
Rated beam angel (˚):	70°
Rated CCT (K):	3000K, 4000K, 6500K
Rated life time (h):	30000h
Lamp type:	LED
Declared Colour rendering (CRI)Ra:	≥80

Declared Colour rendering (CRI)R9:	1
Declared Displacement factor for LED and OLED MLS (DF) :	0.5
Declared Lumen maintenance factor for LED and OLED:	≥96%
Declared Survival factor for LED and OLED:	≥90%
Declared colour consistency for LED and OLED:	<6
Declared Flicker for LED and OLED MLS (Pst LM) :	1.0
Declared Stroboscopic effect for LED and OLED MLS (SVM)	0.4
Standby power (Psb)(W) :	-
Networked standby power (Pnet) (W):	-
Declared technical data:	LED driver
Model name:	-
Rated Voltage (V):	-
Rated power (Pcg) (W):	-
No-load power (Pno) (W):	-
Standby power (Psb)(W) :	-
Networked standby power (Pnet) (W):	-
Energy efficiency:	-

Picture of the product	
All models are all same, just different at CCT	
	None

Product information:

1.The products are light source- LED Down Light, used as general lighting service.

2. All ‘verdict” in this test report based on test at rated input; other conditions were not considered.

3. All tests were performed on light source intended operating orientation (horizontal, downward).

4. Details see below table:

Table a:Light source

Model name	Rated input	Declared color temperature	Energy consumption in on-mode	Pon wattage (W)
TC50A 9W 3000K	220-240V~,50/60Hz	3000K	9kWh/1000h	9W
	Nominal useful luminous flux (lm)	Ponmax (W)	Declared ηTM (lm/W)	Declared Energy efficiency class
	660lm	9.8W	86.2 lm/W	F
Model name	Rated input	Declared color temperature	Energy consumption in on-mode	Pon wattage (W)
TC50A 9W 4000K	220-240V~,50/60Hz	4000K	9kWh/1000h	9W
	Nominal useful luminous flux (lm)	Ponmax (W)	Declared ηTM (lm/W)	Declared Energy efficiency class
	660lm	9.8W	86.2 lm/W	F
Model name	Rated input	Declared color temperature	Energy consumption in on-mode	Pon wattage (W)
TC50A 9W 6500K	220-240V~,50/60Hz	6500K	9kWh/1000h	9W
	Nominal useful luminous flux (lm)	Ponmax (W)	Declared ηTM (lm/W)	Declared Energy efficiency class
	660lm	9.8W	86.2 lm/W	F

Summary of testing:

Model name	Testing condition
TC50A 9W 3000K, TC50A 9W 4000K, TC50A 9W 6500K	230V~, 50Hz

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 regulation (EU) No 2019/2020 & 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 61000-3-2:2014	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 A27:2014	Lamp caps and holders together with gauges for the control of interchangeability and safety Part1: Lamp caps
EN 60064:1995 Amendments A2:2003 A3:2006 A4:2007 A11:2007	Tungsten filament lamps for domestic and similar general lighting purposes – Performance requirements
EN 60357: 2003 Amendment A2:2008	Tungsten halogen lamps (non-vehicle) – Performance specifications
EN 60969: 2016	Self-ballasted lamps for general lighting services – Performance requirements
CIE 13.3: 1995	Method of Measuring and Specifying Colour 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	Self-ballasted LED-lamps for general lighting services – Performance requirements
IEC 62717:2014	Luminaire performance – Part 1: General requirements
IEC 62722-2-1:2014	Luminaire performance – Part 2-1: Particular requirements for LED luminaires
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 60968:2013	Self-ballasted lamps for general lighting services
EN 62560:2012	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
EN 60357	Tungsten halogen lamps (non-vehicle). Performance specifications
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

ANNEX II: Ecodesign requirements			
1. Energy efficiency requirements			
(a): Light source	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: Ponmax= Cx(L+ Φuse/(Fxη))xR	See table 1 of this report	☒P ☐F ☐N/A ☐Under testing
	The standby power Psb of a light source shall not exceed 0,5 W		☐P ☐F ☒N/A ☐Under testing
	The networked standby power Pnet of a connected light source shall not exceed 0,5 W. The allowable values for Psb and Pnet shall not be added together		☐P ☐F ☒N/A ☐Under testing
(b): Control gear	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: Details see Table 3: Minimum energy efficiency for separate control gear at full-load	See table 4 of this report	☐P ☐F ☒N/A ☐Under testing
	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.		☐P ☐F ☒N/A ☐Under testing
	The standby power Psb of a separate control gear shall not exceed 0,5 W.		☐P ☐F ☒N/A ☐Under testing
	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.		☐P ☐F ☒N/A ☐Under testing
2. Functional requirements			
	From 1 September 2021, the functional requirements specified in Table 4 shall apply for light sources: Table 4: Functional requirements for light sources		☒P ☐F ☐N/A ☐Under testing
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)	See table 1 of this report	☒P ☐F ☐N/A ☐Under testing
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	See table 1 of this report	☒P ☐F ☐N/A ☐Under testing
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(65×ln(0.7))L70	See table 3 of this report	☒P ☐F ☐N/A ☐Under testing

	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		
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.	See table 3 of this report	☒P ☐F ☐N/A ☐Under testing
Colour consistency for LED and OLED light sources	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.	See table 1 of this report	☒P ☐F ☐N/A ☐Under testing
Flicker for LED and OLED MLS	Pst LM ≤ 1,0 at full-load		☒P ☐F ☐N/A ☐Under testing
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 ☐F ☐N/A ☐Under testing
3. Information requirements			
	From 1 September 2021 the following information requirements shall apply: (a) Information to be displayed on the light source itself; (b) Information to be visibly displayed on the packaging; (c) Information to be visibly displayed on a free-access website of the manufacturer, importer or authorised representative; (d) Technical documentation; (e) Information for products specified in point 3 of Annex III.		☐P ☐F ☐N/A ☒Not checked

EQUIPMENTS USED FOR TESTING

Equipment	Brand	Model
AC Power	Everfine	DPS1010
Numeric Multimeter	Everfine	PF310A
Spectroradiometer	Everfine	HAAS-65
DC Power	Everfine	WY3010
Start\Run Up Time Test System	Everfine	START-1000
Integral Sphere	Everfine	AIS-2 1.5m
Luminous Flux Standard Lamp	Everfine	D204
Light Intensity Standard Lamp	Everfine	28V/10A/500cd
Goniophotometer	Everfine	GO-65
Stroboscopic tester	Huipu	HFA-65

Appendix I: – Test results

Table 1 : TC50A 9W 3000K							
Sample No.	Measured voltage (V)	Measured current (A)	Measured Pon (W)	Measured Φuse (lm)	Pon max (W)	R9	CCT (K)
1#	230.0	0.069	8.7	663.1	9.9	5	2985
2#	229.9	0.069	8.7	675.8	10.0	6	3029
3#	230.0	0.068	8.6	665.2	10.0	10	3040
4#	230.0	0.068	8.6	660.8	9.9	9	3045
5#	229.8	0.069	8.7	661.5	9.8	5	3042
6#	229.8	0.069	8.7	679.3	10.0	7	3024
7#	230.0	0.068	8.6	664.3	9.9	8	3029
8#	229.9	0.069	8.7	669.6	10.0	9	2967
9#	229.8	0.069	8.7	676.7	10.1	7	3006
10#	229.9	0.069	8.6	661.8	9.8	9	3008
Average	229.9	0.069	8.7	667.8	9.9	8	3018
Sample No.	Colour rendering (CRI)	Colour consistency (SDCM)	Displacement factor (DF)	Flicker (Pst LM)	Stroboscopic effect (SVM)	Psb (W)	Pnet (W)
1#	81.9	4.4	0.924	0.023	0.012	--	--
2#	80.7	4.0	0.922	0.022	0.012	--	--
3#	80.8	5.0	0.922	0.023	0.011	--	--
4#	81.5	4.6	0.923	0.020	0.012	--	--
5#	80.3	4.1	0.920	0.023	0.010	--	--
6#	80.5	4.0	0.924	0.023	0.011	--	--
7#	80.3	4.9	0.922	0.023	0.011	--	--
8#	81.4	4.4	0.923	0.024	0.012	--	--
9#	81.3	4.6	0.919	0.024	0.011	--	--
10#	80.1	4.5	0.924	0.023	0.011	--	--
Average	80.9	4.5	0.922	0.023	0.011	--	--
Required	**≥ 80**	**≤6**	**≥0.5**	**≤1.0**	**≤0.4**	**≤0.5**	**≤0.5**

Ponmax = C x (L + Φuse / (F x η) x R					
Correction factor	C	1.23	Efficacy factor	F	0.85
End loss factor (W)	L	1.5	Threshold efficacy (lm/W)	η	120.0
Useful luminous (lm)	Φuse	See measured Φuse	CRI factor	R	(Ra + 80)/160

Table 2 : TC50A 9W 3000K									
Sample No.	Meausred Φuse (lm)	Declared Φuse (lm)	Measured Pon (W)	Declared Pon (W)	F_{TM}	Measured ηTM (lm/W)	Declared ηTM (lm/W)	Energy efficiency class basing on measured values	Energy efficiency class basing on declared values
1#	663.1	660	8.7	9.0	1.176	89.6	86.2	--	--
2#	675.8	660	8.7	9.0	1.176	91.3	86.2	--	--
3#	665.2	660	8.6	9.0	1.176	90.9	86.2	--	--
4#	660.8	660	8.6	9.0	1.176	90.3	86.2	--	--
5#	661.5	660	8.7	9.0	1.176	89.4	86.2	--	--
6#	679.3	660	8.7	9.0	1.176	91.8	86.2	--	--
7#	664.3	660	8.6	9.0	1.176	90.8	86.2	--	--
8#	669.6	660	8.7	9.0	1.176	90.5	86.2	--	--
9#	676.7	660	8.7	9.0	1.176	91.4	86.2	--	--
10#	661.8	660	8.6	9.0	1.176	90.4	86.2	--	--
Average	667.8	660	8.7	9.0	1.176	90.6	86.2	F	F

Energy efficiency class:

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

Factors F_{TM} by light source type:

☐NDLS & MLS: 1.00
☐NDLS & NMLS: 0.926
☒DLS & MLS: 1.176
☐DLS & NMLS: 1.089

Table 3 : TC50A 9W 3000K							
Sample No.	Initial Φuse (lm)	3600H Φuse (lm)	$X_{LMF,MIN}$% at 3600H	Survival factor at 3600H	Measured beam angle (°)	Measured Imax (cd)	Measured light output within π sr
1#	663.1	641.2	96.7%	Yes	70.0	537.9	90.2%
2#	675.8	655.5	97.0%	Yes	69.6	537.0	90.4%
3#	665.2	643.9	96.8%	Yes	69.8	536.1	90.7%
4#	660.8	641.6	97.1%	Yes	69.8	540.6	90.2%
5#	661.5	641.7	97.0%	Yes	69.6	549.5	89.8%
6#	679.3	661.6	97.4%	Yes	69.4	552.4	90.0%
7#	664.3	642.4	96.7%	Yes	69.1	531.5	90.5%
8#	669.6	646.8	96.6%	Yes	69.4	532.2	90.4%
9#	676.7	654.4	96.7%	Yes	69.3	556.0	90.3%
10#	661.8	641.9	97.0%	Yes	69.5	549.5	90.6%
Average	667.8	647.1	96.9%	Yes	69.6	542.3	90.3%
Required	**--**	**--**	**≥ 96%**	**≥ 90%**	-	-	-

Table 4 for model _LED driver								
Sample No.	Measured voltage(V)	Measured current (mA)	Input wattage (W)	Output wattage (W)	Energy efficiency	Pno (W)	Psb (W)	Pnet (W)
1#	--	--	--	--	--	--	--	--
2#	--	--	--	--	--	--	--	--
3#	--	--	--	--	--	--	--	--
Average	--	--	--	--	--	--	--	--
Required	**--**	**--**	**--**	**--**	**--**	**≤0.5**	**≤0.5**	**≤0.5**

Table 1 : TC50A 9W 4000K							
Sample No.	Measured voltage (V)	Measured current (A)	Measured Pon (W)	Measured Φuse (lm)	Pon max (W)	R9	CCT (K)
1#	230.1	0.067	8.4	673.0	10.2	8	3980
2#	229.9	0.069	8.7	691.4	10.3	7	4043
3#	229.8	0.068	8.6	696.8	10.5	11	4065
Average	229.9	0.068	8.6	687.1	10.3	9	4029
Sample No.	Colour rendering (CRI)	Colour consistency (SDCM)	Displacement factor (DF)	Flicker (Pst LM)	Stroboscopic effect (SVM)	Psb (W)	Pnet (W)
1#	83.3	3.9	0.922	0.025	0.016	--	--
2#	82.1	4.7	0.917	0.021	0.010	--	--
3#	83.3	4.9	0.920	0.022	0.012	--	--
Average	82.9	4.5	0.920	0.023	0.013	--	--
Required	**≥ 80**	**≤6**	**≥0.5**	**≤1.0**	**≤0.4**	**≤0.5**	**≤0.5**

Ponmax = C x (L + Φuse / (F x η) x R					
Correction factor	C	1.23	Efficacy factor	F	0.85
End loss factor (W)	L	1.5	Threshold efficacy (lm/W)	η	120.0
Useful luminous (lm)	Φuse	See measured Φuse	CRI factor	R	(Ra + 80)/160

Table 2 : TC50A 9W 4000K									
Sample No.	Meausred Φuse (lm)	Declared Φuse (lm)	Measured Pon (W)	Declared Pon (W)	F_{TM}	Measured ηTM (lm/W)	Declared ηTM (lm/W)	Energy efficiency class basing on measured values	Energy efficiency class basing on declared values
1#	673.0	660	8.4	9.0	1.176	94.2	86.2	--	--
2#	691.4	660	8.7	9.0	1.176	93.4	86.2	--	--
3#	696.8	660	8.6	9.0	1.176	95.2	86.2	--	--
Average	687.1	660	8.6	9.0	1.176	94.2	86.2	F	F

Energy efficiency class:

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

Factors F_{TM} by light source type:

☐NDLS & MLS: 1.00
☐NDLS & NMLS: 0.926
☒DLS & MLS: 1.176
☐DLS & NMLS: 1.089

Table 3 : TC50A 9W 4000K							
Sample No.	Initial Φuse (lm)	3600H Φuse (lm)	$X_{LMF,MIN}$% at 3600H	Survival factor at 3600H	Measured beam angle (°)	Measured Imax (cd)	Measured light output within π sr
1#	673.0	652.8	97.0%	Yes	73.2	526.4	89.8%
2#	691.4	671.3	97.1%	Yes	72.7	543.4	89.6%
3#	696.8	673.1	96.6%	Yes	72.6	545.6	89.7%
Average	687.1	665.7	96.9%	Yes	72.8	538.5	89.7%
Required	**--**	**--**	**≥ 96%**	**≥ 90%**	-	-	-

Table 1 : TC50A 9W 6500K							
Sample No.	Measured voltage (V)	Measured current (A)	Measured Pon (W)	Measured Φuse (lm)	Pon max (W)	R9	CCT (K)
1#	230.1	0.068	8.6	670.0	10.3	22	6629
2#	229.9	0.068	8.6	712.1	10.7	23	6779
3#	229.9	0.068	8.6	704.9	10.8	23	6793
Average	230.0	0.068	8.6	695.7	10.6	23	6734
Sample No.	Colour rendering (CRI)	Colour consistency (SDCM)	Displacement factor (DF)	Flicker (Pst LM)	Stroboscopic effect (SVM)	Psb (W)	Pnet (W)
1#	86.5	2.7	0.923	0.025	0.011	--	--
2#	85.2	3.1	0.919	0.021	0.005	--	--
3#	85.6	2.4	0.923	0.023	0.005	--	--
Average	85.8	2.7	0.922	0.023	0.007	--	--
Required	**≥ 80**	**≤6**	**≥0.5**	**≤1.0**	**≤0.4**	**≤0.5**	**≤0.5**

Ponmax = C x (L + Φuse / (F x η) x R					
Correction factor	C	1.23	Efficacy factor	F	0.85
End loss factor (W)	L	1.5	Threshold efficacy (lm/W)	η	120.0
Useful luminous (lm)	Φuse	See measured Φuse	CRI factor	R	(Ra + 80)/160

Table 2 : TC50A 9W 6500K									
Sample No.	Meausred Φuse (lm)	Declared Φuse (lm)	Measured Pon (W)	Declared Pon (W)	F_{TM}	Measured ηTM (lm/W)	Declared ηTM (lm/W)	Energy efficiency class basing on measured values	Energy efficiency class basing on declared values
1#	670.0	660	8.6	9.0	1.176	91.6	86.2	--	--
2#	712.1	660	8.6	9.0	1.176	97.3	86.2	--	--
3#	704.9	660	8.6	9.0	1.176	96.3	86.2	--	--
Average	695.7	660	8.6	9.0	1.176	95.0	86.2	F	F

Energy efficiency class:

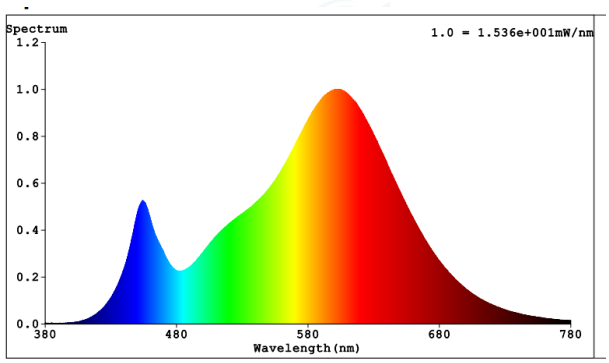
A: 210 ≤ ηTM
B: 185 ≤ ηTM < 210
C: 160 ≤ ηTM < 185
D: 135 ≤ ηTM < 160
E: 110 ≤ ηTM < 135
F: 85 ≤ ηTM < 110
G: ηTM < 85

Factors F_{TM} by light source type:

☐NDLS & MLS: 1.00
☐NDLS & NMLS: 0.926
☒DLS & MLS: 1.176
☐DLS & NMLS: 1.089

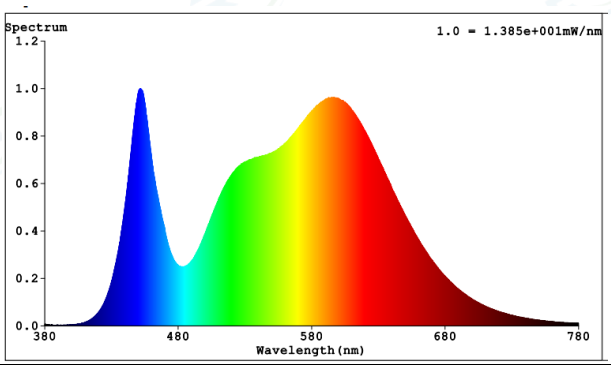
Table 3 : TC50A 9W 6500K							
Sample No.	Initial Φuse (lm)	3600H Φuse (lm)	$X_{LMF,MIN}$% at 3600H	Survival factor at 3600H	Measured beam angle (°)	Measured Imax (cd)	Measured light output within π sr
1#	670.0	647.9	96.7%	Yes	70.7	550.6	90.0%
2#	712.1	693.6	97.4%	Yes	70.0	562.0	90.2%
3#	704.9	684.5	97.1%	Yes	70.0	542.6	89.7%
Average	695.7	675.3	97.1%	Yes	70.2	551.7	90.0%
Required	**--**	**--**	**≥ 96%**	**≥ 90%**	-	-	-

Table 5: Spectrum & Polar Plot of 3000K



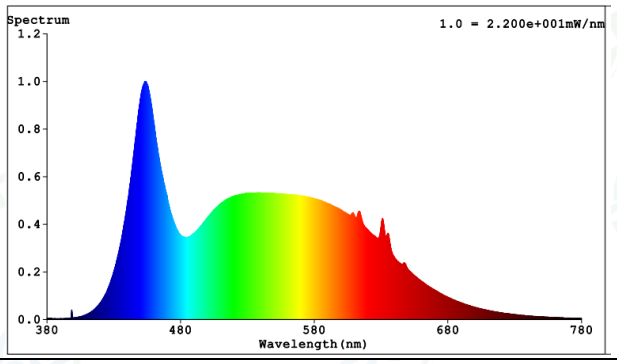
Spectrum

Table 5: Spectrum & Polar Plot of 4000K



Spectrum

Table 5: Spectrum & Polar Plot of 6500K



Spectrum

Appendix II: Product information sheet

Product information sheet			
Supplier's name or trade mark:	Hangzhou Tiger Electron& Electric Co., Ltd.		
Supplier's address:	NO.15 xingfa Rd., xingqiao town, liping district, hangzhou, P.R. China		
Model identifier:	TC50A 9W 3000K		
Type of light source:	LED		
Light source cap-type:	connection by supply cord		
Lighting technology used:	LED	Non-directional or directional:	DLS
Mains or non-mains:	MLS	Connected light source (CLS):	no
Colour-tuneable light source:	no	Envelope:	no
High luminance light source:	no		
Anti-glare shield:	no	Dimmable:	no
Product parameters			
Parameter	Value	Parameter	Value
General product parameters:			
Energy consumption in on-mode (kWh/1 000 h)	9kWh/1000h	Energy efficiency class	F
Useful luminous flux (Φ_{use}), indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°)	660lm in a narrow cone (90°)	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	3000K
On-mode power (P_{on}), expressed in W	9W	Standby power (P_{sb}), expressed in W and rounded to the second decimal	0.00
Networked standby power (P_{net}) for CLS, expressed in W and rounded to the second decimal	0.00	Colour rendering index, rounded to the nearest integer, or the range of CRI values that can be set	80
Outer dimensions without separate control gear, lighting control parts and nonlighting control parts, if any (millimetre) — Height	32.5mm	Spectral power distribution in the range 8140 nm to 800 nm, at full-load	See the figure above
Width	50mm		
Depth	50mm		
Claim of equivalent power	-	If yes, equivalent power (W)	-
		Chromaticity coordinates (x and y)	3000K: (x: 0.4400; y: 0.4030)
Parameters for directional light sources:			
Peak luminous intensity (cd)	550cd	Beam angle in degrees, or the range of beam angles that can be set	70°
Parameters for LED and OLED light sources:			
R9 colour rendering index value	1	Survival factor	90%

the lumen maintenance factor	96%		
Parameters for LED and OLED mains light sources:			
displacement factor (cos φ1)	0.5	Colour consistency in McAdam ellipses	≤6
Claims that an LED light source replaces a fluorescent light source without integrated ballast of a particular wattage.	-	If yes then replacement claim (W)	-
Flicker metric (P_{st} LM)	1.0	Stroboscopic effect metric (SVM)	0.4

Product information sheet				
Supplier's name or trade mark:	Hangzhou Tiger Electron& Electric Co., Ltd.			
Supplier's address:	NO.15 xingfa Rd., xingqiao town, liping district, hangzhou, P.R. China			
Model identifier:	TC50A 9W 4000K			
Type of light source:	LED			
Light source cap-type:	connection by supply cord			
Lighting technology used:	LED		Non-directional or directional:	DLS
Mains or non-mains:	MLS		Connected light source (CLS):	no
Colour-tuneable light source:	no		Envelope:	no
High luminance light source:	no			
Anti-glare shield:	no		Dimmable:	no
Product parameters				
Parameter	Value		Parameter	Value
General product parameters:				
Energy consumption in on-mode (kWh/1 000 h)	9kWh/1000h		Energy efficiency class	F
Useful luminous flux (Φ_{use}), indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°)	660lm in a narrow cone (90°)		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	4000K
On-mode power (P_{on}), expressed in W	9W		Standby power (P_{sb}), expressed in W and rounded to the second decimal	0.00
Networked standby power (P_{net}) for CLS, expressed in W and rounded to the second decimal	0.00		Colour rendering index, rounded to the nearest integer, or the range of CRI values that can be set	80
Outer dimensions without separate control gear, lighting control parts and nonlighting control parts, if any (millimetre)	Height	32.5mm	Spectral power distribution in the range 8140 nm to 800 nm, at full-load	See the figure above
	Width	50mm		
	Depth	50mm		
Claim of equivalent power		-	If yes, equivalent power (W)	-
			Chromaticity coordinates (x and y)	4000K: (x: 0.3800; y: 0.3800)
Parameters for directional light sources:				
Peak luminous intensity (cd)	550cd		Beam angle in degrees, or the range of beam angles that can be set	70°
Parameters for LED and OLED light sources:				
R9 colour rendering index value	1		Survival factor	90%

the lumen maintenance factor	96%		
Parameters for LED and OLED mains light sources:			
displacement factor (cos φ1)	0.5	Colour consistency in McAdam ellipses	≤6
Claims that an LED light source replaces a fluorescent light source without integrated ballast of a particular wattage.	-	If yes then replacement claim (W)	-
Flicker metric (P_{st} LM)	1.0	Stroboscopic effect metric (SVM)	0.4

Product information sheet			
Supplier's name or trade mark:	Hangzhou Tiger Electron& Electric Co., Ltd.		
Supplier's address:	NO.15 xingfa Rd., xingqiao town, liping district, hangzhou, P.R. China		
Model identifier:	TC50A 9W 6500K		
Type of light source:	LED		
Light source cap-type:	connection by supply cord		
Lighting technology used:	LED	Non-directional or directional:	DLS
Mains or non-mains:	MLS	Connected light source (CLS):	no
Colour-tuneable light source:	no	Envelope:	no
High luminance light source:	no		
Anti-glare shield:	no	Dimmable:	no
Product parameters			
Parameter	Value	Parameter	Value
General product parameters:			
Energy consumption in on-mode (kWh/1 000 h)	9kWh/1000h	Energy efficiency class	F
Useful luminous flux (Φ_{use}), indicating if it refers to the flux in a sphere (360°), in a wide cone (120°) or in a narrow cone (90°)	660lm in a narrow cone (90°)	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	6500K
On-mode power (P_{on}), expressed in W	9W	Standby power (P_{sb}), expressed in W and rounded to the second decimal	0.00
Networked standby power (P_{net}) for CLS, expressed in W and rounded to the second decimal	0.00	Colour rendering index, rounded to the nearest integer, or the range of CRI values that can be set	80
Outer dimensions without separate control gear, lighting control parts and nonlighting control parts, if any (millimetre) — Height	32.5mm	Spectral power distribution in the range 8140 nm to 800 nm, at full-load	See the figure above
Width	50mm		
Depth	50mm		
Claim of equivalent power	-	If yes, equivalent power (W)	-
		Chromaticity coordinates (x and y)	6500K: (x: 0.3130; y: 0.3370)
Parameters for directional light sources:			
Peak luminous intensity (cd)	550cd	Beam angle in degrees, or the range of beam angles that can be set	70°
Parameters for LED and OLED light sources:			
R9 colour rendering index value	1	Survival factor	90%

the lumen maintenance factor	96%		
Parameters for LED and OLED mains light sources:			
displacement factor (cos φ1)	0.5	Colour consistency in McAdam ellipses	≤6
Claims that an LED light source replaces a fluorescent light source without integrated ballast of a particular wattage.	-	If yes then replacement claim (W)	-
Flicker metric (P_{st} LM)	1.0	Stroboscopic effect metric (SVM)	0.4

Appendix III: Information Requirements

For COMMISSION REGULATION (EU) 2019/2020:

3. Information requirements

From 1 September 2021 the following information requirements shall apply:

(a) Information to be displayed on the light source itself

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

For directional light sources, the beam angle (°) shall also be indicated.

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

(b) Information to be visibly displayed on the packaging

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

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:

(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°);

(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;

(c) the beam angle in degrees (for directional light sources), or the range of beam angles that can be set;

(d) electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC);

(e) the L70B50 lifetime for LED and OLED light sources, expressed in hours;

(f) the on-mode power (Pon), expressed in W;

(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;

(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;

(i) the colour rendering index, rounded to the nearest integer, or the range of CRI-values that can be set;

(j) if CRI< 80, and the light source is intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI< 80, a clear indication to this effect. For HID light sources with useful luminous flux > 4 000 lm, this indication is not mandatory;

(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;

(l) a warning if the light source cannot be dimmed or can be dimmed only with specific dimmers or with specific wired or wireless dimming methods. In the latter cases a list of compatible dimmers and/or methods shall be provided on the manufacturer's website;

(m) if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place;

(n) if the light source is within the scope of Directive 2012/19/EU, without prejudice to marking obligations pursuant to Article 14(4) of Directive 2012/19/EU, or contains mercury: a warning that it shall not be disposed of as unsorted municipal waste.

Items (a) to (d) shall be displayed on the packaging in the direction meant to face prospective buyer; for other items this is also recommended, if space permits.
For light sources that can be set to emit light with different characteristics, the information shall be reported for the reference control settings. In addition, a range of obtainable values may be indicated.
The information does not need to use the exact wording on the list above. Alternatively, it may be displayed in the form of graphs, drawings or symbols.

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

(a) the maximum output power of the control gear (for HL, LED and OLED) or the power of the light source for which the control gear is intended (for FL and HID);

(b) the type of light source(s) for which it is intended;

(c) the efficiency in full-load, expressed in percentage;

(d) the no-load power (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;

(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;

(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;

(g) a warning if the control gear is not suitable for dimming of light sources or can be used only with specific types of dimmable light sources or using specific wired or wireless dimming methods. In the latter cases, detailed information on the conditions in which the control gear can be used for dimming shall be provided on the manufacturer's or importer's website;

(h) a QR-code redirecting to a free-access website of the manufacturer, importer or authorised representative, or the internet address for such a website, where full information on the control gear can be found.
The information does not need to use the exact wording on the list above. Alternatively, it may be displayed in the form of graphs, drawings or symbols.

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

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

(a) the information specified in point 3(b)(2), except 3(b)(2)(h);

(b) the outer dimensions in mm;

(c) the mass in grams of the control gear, without packaging, and without lighting control parts and non-lighting parts, if any and if they can be physically separated from the control gear;

(d) instructions on how to remove lighting control parts and non-lighting parts, if any, or how to switch them off or minimise their power consumption during control-gear testing for market surveillance purposes;

(e) if the control gear can be used with dimmable light sources, a list of minimum characteristics that the light sources should have to be fully compatible with the control gear during dimming, and possibly a list of compatible dimmable light sources;

(f) recommendations on how to dispose of it at the end of its life in line with Directive 2012/19/EU.

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

(g) Technical documentation

(1) Separate control gears:

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

(e) Information for products specified in point 3 of Annex III

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

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

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

Article 4 Removal of light sources and separate control gears

1. Manufacturers, importers or authorised representatives of containing products shall ensure that light sources and separate control gears can be replaced with the use of common available tools and without permanent damage to the containing product, unless a technical justification related to the functionality of the containing product is provided in the technical documentation explaining why the replacement of light sources and separate control gear is not appropriate. The technical documentation shall also provide instructions on how light sources and separate control gears can be removed without being permanently damaged for verification purposes by market surveillance authorities.

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

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

For COMMISSION DELEGATED REGULATION (EU) 2019/2015:
ANNEX IV: Product information

1. Product information sheet

1.1. Pursuant to point 1(b) of Article 3, the supplier shall enter into the product database the information as set out in Table 3, including when the light source is a part in a containing product. Details see table 3: Product information sheet.

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.

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.

2. Information to be displayed in the documentation for a containing product

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.

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:

“This product contains a light source of energy efficiency class <X>”, where <X> shall be replaced by the energy efficiency class of the contained light source.

If the product contains more than one light source, the sentence can be in the plural, or repeated per light source, as suitable.

3. Information to be displayed on the supplier’s free access website:

(a) The reference control settings, and instructions on how they can be implemented, where applicable;

(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;

(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;

(d) If the light source contains mercury: instructions on how to clean up the debris in case of accidental breakage;

(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 (1).

4. Information for products specified in point 3 of Annex IV

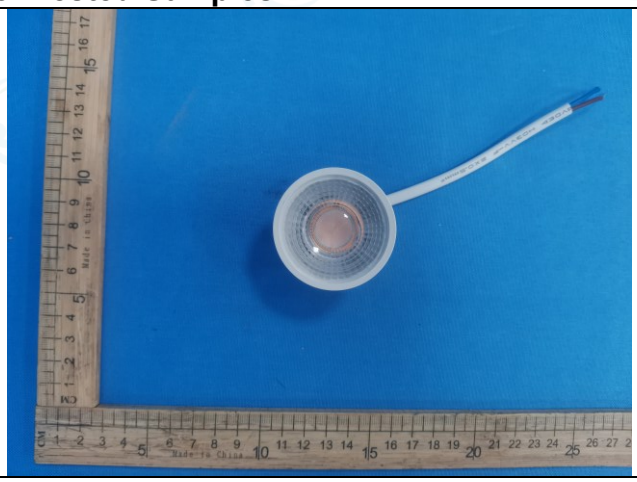
For the light sources specified in point 3 of Annex IV, their intended use shall be stated on all forms of packaging, product information and advertisement, together with a clear indication that the light source is not intended for use in other applications.

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.

Appendix V: Making, packing and instruction

<table>
<tr><td colspan="6">Making on product</td></tr>
<tr><td colspan="2">☐light source</td><td colspan="4">☒Luminaire</td></tr>
<tr><td rowspan="2">☐ Indirect</td><td rowspan="2">☐ Direct</td><td colspan="2">☐removeable light source
(Marking on removeable light source)</td><td colspan="2">☒non-removeable light source
(Marking on Luminaire surface)</td></tr>
<tr><td>☐ Indirect</td><td>☐ Direct</td><td>☐ Indirect</td><td>☒ Direct</td></tr>
<tr><td>Rated luminous flux
Colour temperature</td><td>Rated luminous flux
Colour temperature
Beam Angle</td><td>Rated luminous flux
Colour temperature</td><td>Rated luminous flux
Colour temperature
Beam Angle</td><td>Rated luminous flux
Colour temperature</td><td>Rated luminous flux
Colour temperature
Beam Angle</td></tr>
<tr><td colspan="6">Notice: The above information is required in ERP, it should be used in conjunction with the identification required in the LVD</td></tr>
<tr><td colspan="6">Packing Required</td></tr>
<tr><td colspan="3">☐light source
☒Luminaire - non-removeable light source</td><td colspan="3">☐Luminaire - removeable light source</td></tr>
<tr><td colspan="3" rowspan="8">a. Rated luminous flux & in a sphere (360°or 120°or 90°)
b. Colour temperature
c. Beam Angle- (only to direct light)
d. Rated electrical parameter: Voltage, Frequency, Current, Power
e. Life time
f. Pst: (If not applicable, no required)
g. Pnet: (If not applicable, no required)
h. Ra: (If Ra<80, should added: Product intended for use in outdoor applications, industrial applications or other applications)
i. Ta: (if ta≠25°C, should be added)
j. Dimmable or non-dimmable symbol
k. Hg content: (If the product contains mercury, should show X.X mg)
l. WEEE logo</td><td colspan="3">Symbols and statement</td></tr>
<tr><td>☐</td><td colspan="2">Replaceable light source by a professional</td></tr>
<tr><td>☐</td><td colspan="2">Replaceable (LED only) light source by a professional</td></tr>
<tr><td>☐</td><td colspan="2">Non-replaceable light source</td></tr>
<tr><td>☐</td><td colspan="2">Replaceable light source by an end-user</td></tr>
<tr><td>☐</td><td colspan="2">Replaceable Control gear by a professional</td></tr>
<tr><td>☐</td><td colspan="2">Replaceable Control gear by an end-user</td></tr>
<tr><td>☐</td><td colspan="2">Non-replaceable Control gear</td></tr>
<tr><td colspan="6">instruction</td></tr>
<tr><td colspan="3">☐light source
☒Luminaire - non-removeable light source</td><td colspan="3">☐Luminaire - removeable light source</td></tr>
<tr><td colspan="3">No special required</td><td colspan="3">☐ Symbols and statement on packing
☐ This product contains X light source of energy efficiency class <Y> (X=1,2,3.., Y=A,B,C,D,E,F,G, according the actual value)</td></tr>
</table>

Appendix VI: Photos of Tested Samples



Over view light, All models are all same, just different at CCT

End of Report