TEST REPORT

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

Report reference No ..... :	LCS211108115BS
Tested by……..:	Seth Cai (Project Engineer)
Check by……..:	Ian Luo (Director)
Approved by……..:	Jesse Liu (Manager)
Date of issue .....:	May 28, 2022
Contents.....:	13 pages

Testing laboratory

Name .....:	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
Address .....:	101-201, No.39 Buliding, Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China
Testing location .....:	As above

Client

Name .....:	Shenzhen Penel Optoelectronics Technology Co., Ltd
Address.....:	The 1st Building, Xi’en Industrial District, No. 227, Xiangshan Avenue, Yanluo Street, Bao’an District, 518105 Shenzhen, PEOPLE’S REPUBLIC OF CHINA

Manufacturer

Name .....:	Shenzhen Penel Optoelectronics Technology Co., Ltd
Address.....:	The 1st Building, Xi’en Industrial District, No. 227, Xiangshan Avenue, Yanluo Street, Bao’an District, 518105 Shenzhen, PEOPLE’S REPUBLIC OF CHINA

Test specification

Standard.....:	COMMISSION REGULATION (EU) 2019/2020 COMMISSION DELEGATED REGULATION (EU) 2019/2015 COMMISSION DELEGATED REGULATION (EU) 2021/340 COMMISSION DELEGATED REGULATION (EU) 2021/341
Test procedure .....:	COMMISSION REGULATION (EU) 2019/2020 COMMISSION DELEGATED REGULATION (EU) 2019/2015 COMMISSION DELEGATED REGULATION (EU) 2021/340 COMMISSION DELEGATED REGULATION (EU) 2021/341
Non-standard test method	N/A

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Test item Description ……..:	LED STREET LIGHT
Trademark ……..:	PENEL
Model and/or type reference.....:	STL-100W-NS10
Rating(s)(V/Hz)……..:	AC100-240V, 50/60Hz, 100W
Test case verdicts	
Test case does not apply to the test object :	N(N/A)
Test item does meet the requirement .....:	P(Pass)
Test item does not meet the requirement ...:	F(Fail)
Testing	
Date of receipt of test item .....:	December 22, 2021
Date(s) of performance of test.....:	December 22, 2021 – May 28, 2022
Test item particulars:	
Type of light source:	
- Lighting technology used	☐ HL ☐ LFLT5HE ☐ LFL T5HO ☐ CFLni ☐ other FL ☐ HPS ☐ MH ☐ other HID ☒ LED ☐ OLED ☐ mixed ☐ other
- Non-directional or directional	☒ NDLS ☐ DLS
- Mains or non-mains	☒ MLS ☐ NMLS
- Connected light source (CLS)	☐ Yes ☒ No
- Colour-tuneable light source	☐ Yes ☒ No
- Envelope	☒ no ☐ second ☐ non-clear
- High luminance light source	☐ Yes ☒ No
- Anti-glare shield	☐ Yes ☒ No
- Dimmable	☐ Yes ☐ only with specific dimmers ☒ No
- Control gear	☒ Integrated ☐ External
- Use of light source:	☐ Indoor ☒ Outdoor ☐ Industry
Lamp cap installed:	N/A
General product parameters :	
Energy consumption in on-mode (kWh/1 000 h)	100
Energy efficiency class	☐ A ☐ B ☐ C ☒ D ☐ E ☐ F ☐ G
Rated useful luminous flux……(lm):	15000lm
Rated CCT ……..……..(K):	4000
On-mode power (Pon), expressed in W.....:	100

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Standby power (Psb)…….....(W):	N/A
Networked standbypower(Pnet)for CLS.(W):	N/A
Rated Ra.....:	70(use in out- door)
Outer dimensions.....(mm):	N/A
Spectral power distribution.....:	See attachment 2
Claim of equivalent power .....:	☐ Yes: ☒ N/A
Chromaticity coordinates (x and y).....:	x:0.3880, y:0.3951
Peak luminous intensity .....(cd) :	N/A
Beam angle in degrees.....(°):	N/A
R9 colour rendering index valueR9.....:	-30
Survival factor .....:	100%
The lumen maintenance factor.....:	96%
Displacement factor (cos Φ1).....:	0.9
Colour consistency in McAdam ellipses.....:	6
Claims that an LED light source replaces a fluorescent light source without integrated ballast of a particular wattage.....:	☐ Yes: ☒ N/A
Flicker metric (Pst LM) .....:	0.05
Stroboscopic effect metric (SVM).....:	0.05
Rated life time ……..…..(h):	50000h

Attachments:

The test report includes: ATTACHMENT 1(S) of Energy efficiency classes

The test report includes: ATTACHMENT 2(S) of Spectral power distribution

The test report includes: ATTACHMENT 3(S) of Photos

Summary of testing:

1、 These results are in compliance with the ecodesign requirements of the Commission Regulation (EU) 2019/2020.

2、 Measurement was conducted at voltage AC230V and a stable ambient temperature 25±10℃.

3、 The total harmonic content of the supply voltage shall not exceed 3 %.

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Equipment List:

Instrument	Equipment ID	Model	Calibration Date	Calibration Due Date
Full-field Speed Goniophotometer	SLCS-S-112	GO-R5000	2021/07/02	2022/07/01
Digital Power Meter	SLCS-S-103	PF2010	2021/06/24	2022/06/23
AC Testing Power Source	SLCS-S-115	DPS1060	2021/06/24	2022/06/23
Total Spectral Radiant Flux Standard Lamp	SLCS-S-143	D908S	2021/07/08	2022/07/07
2m Integrating Sphere System	SLCS-S-038	SPR-3000	2021/07/02	2022/07/01
Digital Power Meter	SLCS-S-058	WT310	2021/06/24	2022/06/23
AC Testing Power Source	SLCS-S-111	APW-105N	2021/06/24	2022/06/23
Standard Lamp	SLCS-S-118	S11010017	2021/07/08	2022/07/07
Power Meter	SLCS-S-060	PF9800	2021/06/24	2022/06/23
Flicker Photometer	SLCS-S-119	FP-210	2021/06/24	2022/06/23

General remarks

The test results presented in this report relate only to the object tested.

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"(see Enclosure #)" refers to additioal information appended to the report.

"(see appended table)" refers to a table appended to the report.

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

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(EU) 2019/2020			
Clause	Requirement - Test	Result - Remark	Verdict
Annex I (Clause)	**Definitions in Regulation (EU) 2019/2020**		**P**
	Number of sample used for test ……:	10 pcs	P
(3)	Directional Light Source		**N**
	at least 80 % of total luminous flux within a solid angle of π sr (corresponding to a cone with angle of 120°)		N
(15)	Useful luminous flux Φuse		P
	for non-directional light sources it is the total flux emitted in a solid angle of 4π sr (corresponding to a 360° sphere)		P
	for directional light sources with beam angle ≥ 90° it is the flux emitted in a solid angle of π sr (corresponding to a cone with angle of 120°)		N
	for directional light sources with beam angle < 90° it is the flux emitted in a solid angle of 0,586π sr (corresponding to a cone with angle of 90°)		N
Annex II (Clause)	**Energy Efficiency Requirements in Regulation (EU) 2019/2020**		P
1.(a)	**Energy Efficiency Requirements – Light Source**		P
	On-mode Power Pon (W):	Pon=98.95 W	P
	Maximum Allowed Power Ponmax (W): Ponmax = C x (L + Φuse/(F x η)) x R	Ponmax=128.08 W	P
	Φuse:	15000 lm	P
	Threshold efficacy η (lm/W): η for LED:	120	P
	End loss factor L (W) depending on light source: L for LED:	1.5	P
	End loss factor L (W) for connected light sources: 2.0		N
	Efficacy Factor F: 1.00 for non-directional light sources (NDLS, using total flux)	1.00	P
	Efficacy Factor F: 0.85 for directional light sources (DLS, using flux in a cone)		N
	CRI Factor R: 0.65 for CRI ≤ 25		N
	CRI Factor R: (CRI+80)/160 for CRI > 25, rounded to two decimals	R=(70+80)/160=0.94	P

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Clause	Requirement - Test	Result - Remark	Verdict
	Correction Factor C Depending on Light Source Characteristics in Table 2		N
	Non-directional (NDLS) not operating on mains (NMLS), Basic Value: 1.00		N
	Non-directional (NDLS) operating on mains (MLS), Basic Value: 1.08	1.08	P
	Directional (DLS) not operating on mains (NMLS), Basic Value: 1.15		N
	Directional (DLS) operating on mains (MLS), Basic Value: 1.23		N
	Special Light Source Bonus on C		N
1.(a)	**Standby power – Light Source**		**N**
	The standby power Psb of a light source shall not exceed 0.5 W		N
	The networked standby power Pnet of a connected light source shall not exceed 0.5 W		N
	The allowable values for Psb and Pnet shall not be added together		N
1.(b)	**Energy Efficiency Requirements – Separate Control Gear (at full-load)**		N
	Control gear for LED or OLED light sources: $P_{eg}{}^{0.81}/(1.09 \times P_{eg}{}^{0.81} + 2.10)$		N
	The no-load power Pno of a separate control gear shall not exceed 0.5 W		N
	The standby power Psb of a separate control gear shall not exceed 0.5 W		N
	The networked standby power Pnet of a connected separate control gear shall not exceed 0.5 W		N
	The allowable values for Psb and Pnet shall not be added together		N
2.	**Functional Requirements – Light Source (Table 4)**		P
	Colour Rendering Index CRI: ⩾80	71.5(use in out- door)	P
	Displacement Factor DF at Power Input Pon for LED and OLED MLS:		P
	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	0.981	P
	Lumen Maintenance Factor (for LED and OLED): $X_{LMF,MIN}\% = 100 \times e^{\frac{(3000 \times \ln(0.7))}{L_{70}}}$	96.93%	P
	Survival Factor (for LED and OLED): At least 9 light sources of the test sample must be	100%	P

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(EU) 2019/2020			
Clause	Requirement - Test	Result - Remark	Verdict
	operational after completing the test in Annex V of this Regulation.		
	Colour consistency for LED and OLED light sources: Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.	5.7	P
	Flicker for LED and OLED MLS: Pst LM ≤ 1.0 at full-load	0.009	P
	Stroboscopic effect for LED and OLED MLS: SVM ≤ 0.4 at full-load	0.004	P
3.(a)	**Information to be displayed on the light source itself**		P
	Useful luminous flux (lm)	15000 lm	P
	Correlated colour temperature (K)	4000K	P
	Beam angle (°) For directional light sources		P
3.(b)	**Information to be visibly displayed on the packaging**		P
3.(b)(1)	**Light source placed on the market, not in a containing product**		P
	(a) Useful luminous flux (lm): - 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°)		P
	(b) Correlated Colour Temperature, rounded to the nearest 100 K		P
	(c) Beam angle in degrees For directional light sources		P
	(d) electrical interface details, e.g. cap- or connector-type, type of power supply (e.g. 230 V AC 50 Hz, 12 V DC)		P
	(e) L70B50 lifetime for LED and OLED light sources, expressed in hours		P
	(f) on-mode power (Pon), expressed in W		P
	(g) standby power (Psb), expressed in W and rounded to the second decimal. If the value is zero, it may be omitted from the packaging		P
	(h) 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		P
	(i) Colour Rendering Index, rounded to the nearest integer		P
	(j) Clear indication to this effect, if CRI< 80, and the		P

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Clause	Requirement - Test	Result - Remark	Verdict
	light source is intended for use in outdoor applications, industrial applications or other applications where lighting standards allow a CRI< 80.		
	(k) Information on non-standard conditions (such as ambient temperature Ta ≠ 25 ° C or specific thermal management is necessary)		P
	(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		P
	(m) if the light source contains mercury: a warning of this, including the mercury content in mg rounded to the first decimal place		P
	(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		P
3.(b)(2)	**Separate control gears** For separate control gear placed on the market as a stand-alone product, not as a part of a containing product		N
	(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)		N
	(b) the type of light source(s) for which it is intended		N
	(c) the efficiency in full-load, expressed in percentage		N
	(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		N
	(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		N

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(EU) 2019/2020			
Clause	Requirement - Test	Result - Remark	Verdict
	(f) 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		N
	(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		N
	(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		N
3.(c)	**Information to be visibly displayed on a free-access website of the manufacturer, importer or authorised representative**		N
3.(c)(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:		N
	(a) the information specified in point 3(b)(2), except 3(b)(2)(h)		N
	(b) the outer dimensions in mm		N
	(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		N
	(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		N
	(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		N
	(f) recommendations on how to dispose of it at		N

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Appendix-Test Data Sheet

1、Initial Lumen Measurement and Color Performance:

Sample No.	Power Pon (W)	Disp. Factor	Luminous Flux Φtotal (lm)	Efficacy (lm/W)	Color Temp (CCT)	Color rendering (Ra)	R9	SDCM	x	y
1	98.80	0.980	15382.2	155.69	3938	71.6	-33	5.7	0.3879	0.3951
2	99.05	0.978	15471.4	156.20	3951	71.5	-30	5.6	0.3882	0.3948
3	99.12	0.983	15524.5	156.62	3926	71.6	-35	5.9	0.3880	0.3956
4	98.75	0.981	15324.7	155.19	3930	71.2	-31	5.8	0.3875	0.3952
5	98.68	0.982	15303.8	155.09	3964	71.8	-36	5.6	0.3879	0.3948
6	98.84	0.985	15424.8	156.06	3927	71.2	-32	5.5	0.3886	0.3944
7	98.94	0.979	15497.1	156.63	3971	71.9	-33	5.9	0.3875	0.3956
8	99.15	0.977	15556.3	156.90	3938	71.3	-31	5.8	0.3879	0.3952
9	99.20	0.980	15587.2	157.13	3950	71.4	-35	5.7	0.3883	0.3952
10	99.00	0.982	15470.8	156.27	3921	71.5	-33	5.8	0.3881	0.3953
Avg.	98.95	0.981	15454.3	156.18	3942	71.5	-33	5.7	0.3880	0.3951

2、Different Mode Power 、Flicker、Stroboscopic Effect and Lumen Maintenance Test:

Sample No.	No-Load Power Pno	Standby Power Psb	Network Sb. Power Pnet	Flicker Pst LM	Stroboscopic Effect SVM	Total Luminous flux (lm) After 3600h	Lumen Maintenance at 3600h (%)	Survival factor at 3600h
1	N/A	N/A	N/A	0.008	0.004	14882.3	96.75%	P
2	N/A	N/A	N/A	0.012	0.005	14993.3	96.91%	P
3	N/A	N/A	N/A	0.010	0.003	15066.5	97.05%	P
4	N/A	N/A	N/A	0.006	0.002	14886.4	97.14%	P
5	N/A	N/A	N/A	0.008	0.004	14780.4	96.58%	P
6	N/A	N/A	N/A	0.012	0.008	14937.4	96.84%	P
7	N/A	N/A	N/A	0.011	0.002	15069.4	97.24%	P
8	N/A	N/A	N/A	0.010	0.005	15089.6	97.00%	P
9	N/A	N/A	N/A	0.008	0.003	15110.2	96.94%	P
10	N/A	N/A	N/A	0.014	0.006	14978.8	96.82%	P
Avg.	N/A	N/A	N/A	0.009	0.004	14979.4	96.93%	P

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ATTACHMENT 1(S)

Energy efficiency classes			
Standard	Clause	Model No.	Verdict
(EU) 2019/2015	Energy class	STL-100W-NS10	P
Conditions	-Test conditions: -ambition: 25℃/65%R.H. -Test voltage:AC230V		
Φuse	15000 lm (Declared)		
P_{on}	Pon = 100W (Declared)		
F_{TM}	1.000		
η_{TM}	150.00 lm/w (Declared)		

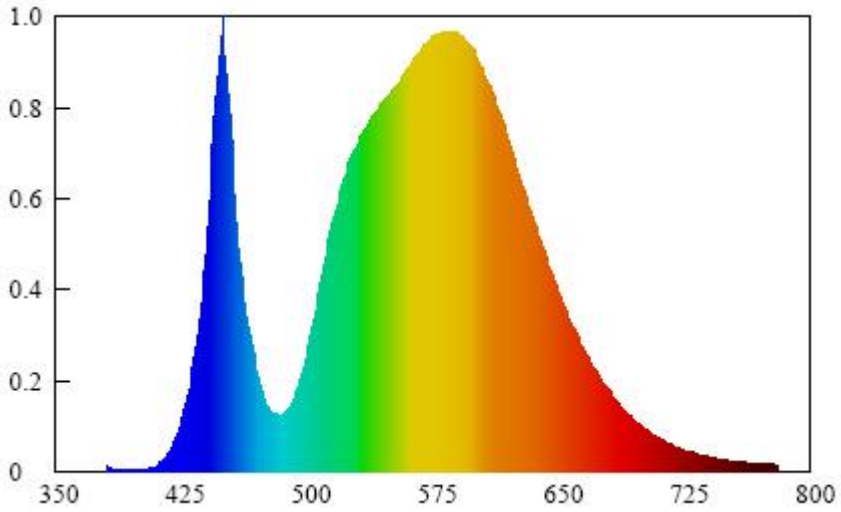
Technical requirements	Test result		
$\eta_{TM} = (\Phi_{use}/P_{on}) \times F_{TM}\ (lm/W)$.	Energy efficiency class	Total mains efficacy η_{TM} (lm/W)	--
	A	210 ≤ η_{TM}	N
	B	185 ≤ η_{TM} < 210	N
	C	160 ≤ η_{TM} < 185	N
	D	135 ≤ η_{TM} < 160	P
	E	110 ≤ η_{TM} < 135	N
	F	85 ≤ η_{TM} < 110	N
	G	η_{TM} < 85	N

Factors FTM by light source type		
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
Directional (DLS) operating on mains (MLS)	1.176	N
Directional (DLS) not operating on mains (NMLS)	1.089	N

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ATTACHMENT 2(S)

Spectral power distribution



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ATTACHMENT 3(S)

Photos of STL-100W-NS10





----- End of test report----

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