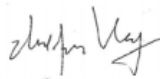
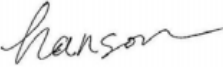




TEST REPORT Ecodesign Requirements for Directional Lamps, LED lamps and related equipment	
Report Reference No.	RF1407110125-ERP
Tested by (name + signature)	Zhijun Wang 
Approved by (name + signature)	Hanson Zhang 
Date of issue	2014-08-05
Number of pages	23
Testing Laboratory	RAYFACT LIGHTING TESTING TECHNOLOGY CO., LIMITED.
Address	GXK buliding, Wuhe Road, Longhua, Shenzhen, Guangdong, China
Applicant's name	SHENZHEN SGSLIGHT TECHNOLOGK CO., LTD.
Address	Area B, 5/F, (Phase 2) Plant Yuexiu Electronic Co., Ltd., Baotian Industrial Park, Xixiang Street Bao'an Dist, Shenzhen, Guangdong, P.R.China
Test specification: Implementing Measure of Energy-related Product	Commission Regulation (EU) No 1194/2012 of 12 December 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for directional Lamps, LED lamps and related equipment Commission Regulation (EC) No 244/2009 of 18 March 2009 and (EC) No 859/2009 of 18 September 2009 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps
Non-standard test method.....	N/A
Test Report Form No.	1194/2012/EC-V2.0
Test procedure	<input type="checkbox"/> Partial test <input checked="" type="checkbox"/> Type test <input type="checkbox"/> Verification test
Test item description:	
Trade Mark	
Manufacturer	SHENZHEN SGSLIGHT TECHNOLOGY CO., LTD. Jinmeiwei Technology Park, High-Tech Industry Park, Guanlan, Baoan, Shenzhen, Guangdong, China
Model/Type reference	TLP-6060
Summary of testing:	This report is a type test report. Until now only, all tests are finished 6000h lumen maintenance and lamp survival factor.

Standard Reference:

- | | |
|---|---|
| <input checked="" type="checkbox"/> 874/2012/EC | <input type="checkbox"/> EN 60061-1: 1993 (incl. all amendments up to A41:2009) |
| <input checked="" type="checkbox"/> EN 61000-3-2: 2006 | <input type="checkbox"/> EN 60064: 1995+A2: 2003+A3: 2006+A4: 2007+A11: 2007 |
| <input checked="" type="checkbox"/> EN 13032-1: 2004+ A1:2012 | <input type="checkbox"/> EN 60357: 2003+A1:2008 |
| <input checked="" type="checkbox"/> CIE 13.3:1995 | <input type="checkbox"/> EN 60969: 1993+A1:1993+A2:2000 |
| <input checked="" type="checkbox"/> CIE 15: 2004 | <input type="checkbox"/> IEC/PAS 62612:2009 |
| <input checked="" type="checkbox"/> CIE 18.2:1983 | <input checked="" type="checkbox"/> IEC/PAS 62717:2011 |
| <input checked="" type="checkbox"/> CIE 84:1989 | <input type="checkbox"/> IEC/PAS 62722-2-1:2011 |
| <input checked="" type="checkbox"/> CIE 97: 2005 | <input type="checkbox"/> EN 60081: 1998 (incl. all amendments up to A4:2010) |
| <input type="checkbox"/> CIE 154: 2003 | <input type="checkbox"/> EN 60901: 1996 (incl. all amendments up to A4:2008) |
| <input type="checkbox"/> EN 60188: 2001 | <input type="checkbox"/> EN 60662: 1993+A4: 1994+A5: 1994+A6: 1994+A7: 1995+ A9:
1997+ A10: 1997 |
| <input checked="" type="checkbox"/> EN 50285: 1999 | |

Test item particulars :

- | | | | |
|--|---|--|---|
| Stage | <input type="checkbox"/> Stage 1 | <input type="checkbox"/> Stage 2 | <input checked="" type="checkbox"/> Stage 3 |
| EUT type | <input checked="" type="checkbox"/> Lamp | <input type="checkbox"/> LED Module | <input type="checkbox"/> Equipment |
| | <input type="checkbox"/> CFL | <input checked="" type="checkbox"/> LED | <input type="checkbox"/> Halogen |
| Light source type | <input type="checkbox"/> Others | | |
| Directionality | <input checked="" type="checkbox"/> Directional | <input type="checkbox"/> Non-directional | |
| Lamp cap | Refer to appendix V Model list | | |
| Rated voltage and frequency (V/Hz) | 100 - 240 Vac; 50/60 Hz | | |
| Rated /nominal wattage (0,1W) | 39.5.0 W | | |
| Declared lamp power factor | >0,95 | | |
| Declared Light output within a solid angle of π sr (%) | N/A | | |
| Declared EEI | 0,1493 | | |
| Declared weighted energy consumption(E_c) kWh/1000h | 39.0 | | |
| Declared New Energy Class | A+ | | |
| Declared start time x,x seconds | <0,5 s | | |
| Declared color rendering (Ra) | 80 | | |
| Declared color consistence -SDCM | <6 | | |
| Rated peak intensity in candela (cd) | N/A | | |
| Rated / nominal beam angle (°) | 117 ° | | |
| Rated / nominal useful lumen (lm) | 4014 lm | | |
| Rated / nominal lamp life | 50,000 h | | |
| Declared color temperature (K) | 5900 K | | |
| Declared number of switching cycles (x) | 200,000 | | |
| Declared number of switching cycles before failure (x) | $\geq 15,000$ | | |

Declared warm up time to 60% of lumen (s) : Instant full light (<1 s)

Declared premature failure : <5,0% at 100 h 200 h 400 h 500 h 1000 h

Declared lumen maintenance at nominal life (except for filament lamp) (%) : 70,0%

Declared lumen maintenance (%) : 0,8 at 2000 h 6000 h 75% of rated average lifetime

Declared survival factor at 6000 h (except for filament lamp) (%) : >0,9

Optimum use in standard condition

Ta = 25°C (Yes / No) : Yes No

Dimmable : Yes No

Application for outdoor/ industrial : Yes No

Warning : Lamp is not suitable for accent lighting : Need No Need

Product drawing : Need No Need

Refer to Appendix VI

An indication of lamp type : Yes No

An equivalence claim (W) : N/A

Mercury content x,x mg : Yes _____ mg No

Declared mercury in amalgam form or Not : Yes No N/A

LED light source (Brand/Model) : SMD2835

Declared dimension of lamp (L x Dia mm) : 595X595mm

Possible test case verdicts:

- test case does not apply to the test object : N/A

- test object does meet the requirement . : P (Pass)

- test object does not meet the requirement : F (Fail)

Testing :

Test on : Rayfact Manufacturer

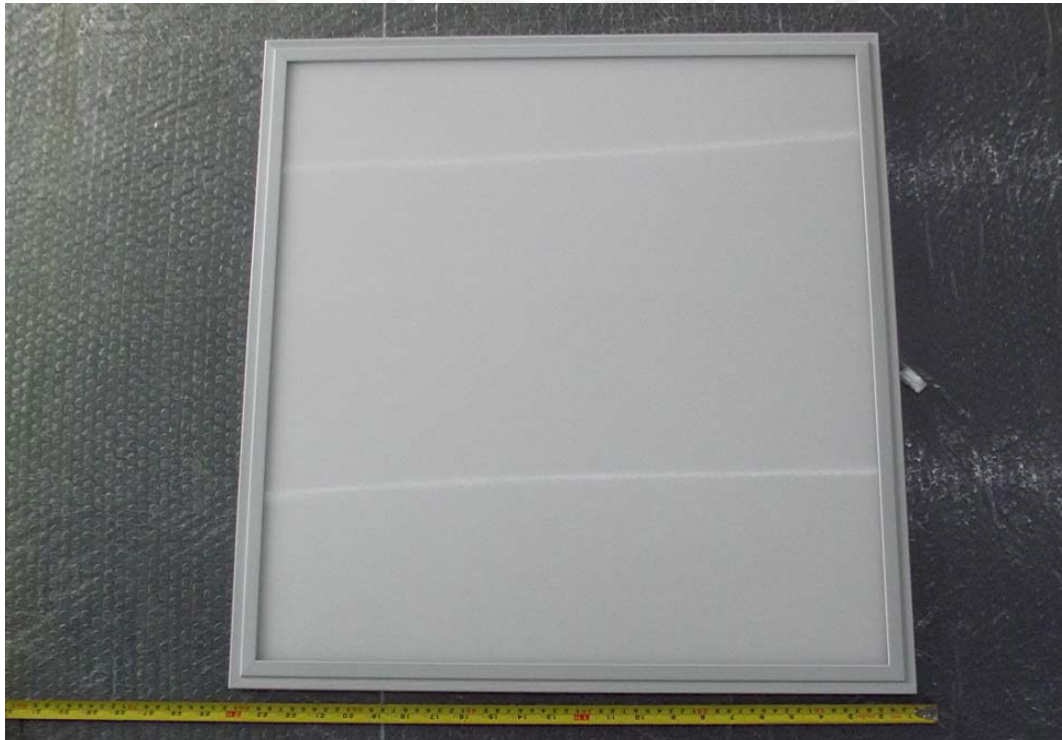
Date of receipt of test item : 2014-1-4

Date (s) of performance of tests : 2014-01-25 to 2014-08-04

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Test	<input type="checkbox"/> Partial test	<input checked="" type="checkbox"/> Type Test	<input type="checkbox"/> Verification test	Verdict
Directionality judgment	1	1	1	P
EEI	20	20	20	P
Useful luminous flux	20	20	20	P
Peak Intensity and beam angle	20	20	20	P
Lamp survival factor	20	20	20	N/A
Lumen maintenance	20	20	20	N/A
Number of switching cycles	20	20	20	P
Starting time	20	20	20	P
Lamp warm-up time	20	20	20	P
Premature failure rate	20	20	20	P
Lamp power factor	20	20	20	P
Color rendering (Ra)	20	20	20	P
Color consistency	20	20	20	P
product information requirements on lamp	--	1	1	N/A
Standard / Regulation	As requested	1194/2012/EC	1194/2012/EC	

Picture of test object:



Copy of Package:

N/A

General remarks:

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

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

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- Appendix: Test Results

General product information :

The products are LED lamp. They are directional lamps.

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1194/2012/EC			
Clause	Test Item	Requirements	Verdict
Article 2	Definitions		
9	Directional lamp: At least 80% Light output within a solid angle of π sr (%)	Checked on Sample 1#, Test Result: 90,8 %	P
10	Non-Directional lamp: lamp is not a directional lamp		N/A
A II-1 of 244/2009/EC	Lamp efficacy requirements for non-directional household lamps		
	Rated luminous flux	$\Phi_{\text{rated}} = \text{--- lm}$	N/A
	Rated power	$P_{\text{rated}} = \text{--- W}$	N/A
Stage 1 to 5			
	Lamp efficacy:	Maximum rated power	
	Clear lamps: $P_{\text{max}} = 0.8 * (0.88 \sqrt{\Phi + 0.049\Phi})$	$P_{\text{max}} = \text{--- W}$	N/A
	Non clear lamps: $P_{\text{max}} = 0.24 \sqrt{\Phi + 0.0103\Phi}$	$P_{\text{max}} = \text{--- W}$	N/A
Stage 6			
	Lamp efficacy	Maximum rated power	
	Clear lamps: $P_{\text{max}} = 0.6 * (0.88 \sqrt{\Phi + 0.049\Phi})$	$P_{\text{max}} = \text{--- W}$	N/A
	Non clear lamps: $P_{\text{max}} = 0.24 \sqrt{\Phi + 0.0103\Phi}$	$P_{\text{max}} = \text{--- W}$	N/A
			N/A
Applied Exemptions			
	Lumen	Maximum rated power	
	Clear lamps $60 \text{ lm} \leq \Phi \leq 950 \text{ lm}$ in Stage 1	$P_{\text{max}} = 1,1 * (0.88 \sqrt{\Phi + 0.049\Phi})$	N/A
	Clear lamps $60 \text{ lm} \leq \Phi \leq 725 \text{ lm}$ in Stage 2	$P_{\text{max}} = 1,1 * (0.88 \sqrt{\Phi + 0.049\Phi})$	N/A
	Clear lamps $60 \text{ lm} \leq \Phi \leq 450 \text{ lm}$ in Stage 3	$P_{\text{max}} = 1,1 * (0.88 \sqrt{\Phi + 0.049\Phi})$	N/A
	Clear lamps with G9 or R7s cap in Stage 6	$P_{\text{max}} = 0,8 * (0.88 \sqrt{\Phi + 0.049\Phi})$	N/A
Applied Correction factors			

1194/2012/EC			
Clause	Test Item	Requirements	Verdict
	Correction scope	Correction scope	
	Filament lamp requiring external power supply	$P_{max} / 1,06$	N/A
	Discharge lamp with cap GX53	$P_{max} / 0,75$	N/A
	Non-clear lamp with colour rendering index ≥ 90 and $P \leq 0.5 *$ ($0.88 \sqrt{\Phi+0.049\Phi}$)	$P_{max} / 0,85$	N/A
	Discharge lamp with colour rendering index ≥ 90 and $T_c \geq 5000K$	$P_{max} / 0.76$	N/A
	Non-clear lamp with second envelope and $P \leq 0.5 * (0.88 \sqrt{\Phi+0.049\Phi})$	$P_{max} / 0.95$	N/A
	LED lamp requiring external power supply	$P_{max} / 1.1$	N/A
AIII-1	Lamp efficacy requirements for directional lamps (Test results see appendix)		
	$EEI_{rated} = P_{cor} / P_{ref}$	$EEI_{rated} = \underline{0,1493}$ (The average results can not vary from the declared values by more than 10%)	
	Corrected power Pcor corrected from Prated based on following table:	$P_{cor} = \underline{39.5.0 W}$	
	Correction factors		
	Scope of the correction	Corrected power (Pcor)	
	Lamps operating on external halogen lamp control gear	$P_{rated} \times 1,06$	
	Lamps operating on external LED lamp control gear	$P_{rated} \times 1,10$	
	Fluorescent lamps of 16 mm diameter (T5 lamps) and 4- pin single capped fluorescent lamps operating on external fluorescent lamp control gear	$P_{rated} \times 1,10$	
	Other lamps operating on external fluorescent lamp control gear	$P_{rated} \times \frac{0,24\sqrt{\phi_{use}} + 0,0103\phi_{use}}{0,15\sqrt{\phi_{use}} + 0,0097\phi_{use}}$	
	Lamps operating on external high-intensity discharge lamp control gear	$P_{rated} \times 1,10$	
	Compact fluorescent lamps with colour rendering index ≥ 90	$P_{rated} \times 0,85$	
	Lamps with anti-glare shield	$P_{rated} \times 0,80$	
	Rated useful luminous flux Φ_{use}	$\Phi_{use} = \underline{4014 lm}$	

1194/2012/EC					
lause	Test Item	Requirements			Verdict
		Non direction lamp : $\Phi_{use} = \Phi_{total}$			N/A
		directional lamps with a beam angle $\geq 90^\circ$ other than filament lamps and carrying a warning on their packaging rated luminous flux in a 120° cone (Φ_{120°)			
		other directional lamps: rated luminous flux in a 90° cone (Φ_{90°).			
		$P_{ref} = 253,44 \text{ W}$			
	P_{ref} is the reference power obtained from the useful luminous flux of the lamp (Φ_{use})	For models with $\Phi_{use} < 1\,300$ lumen: $0,88 \sqrt{\Phi_{use}} + 0,049\Phi_{use}$			
		For models with $\Phi_{use} \geq 1\,300$ lumen: $P_{ref} = 0,07341\Phi_{use}$			
Maximum energy efficiency index (EEI)					
	Application date	<input type="checkbox"/> Mains-voltage filament lamps	<input type="checkbox"/> Other filament lamps	<input type="checkbox"/> HID lamps	<input checked="" type="checkbox"/> Other lamps
	Stage 1	If $\Phi_{use} > 450$ lm: 1,75	If $\Phi_{use} \leq 450$ lm: 1,20 If $\Phi_{use} > 450$ lm: 0,95	0,50	0,50
	Stage 2	1,75	0,95	0,50	0,50
	Stage 3	0,95	0,95	0,36	0,20
AIII-2	Lamp functionality requirements (Test results see appendix)				
AIII-2.1	Directional Compact Fluorescent Lamps :	<input type="checkbox"/> Stage 1 Except where indicated otherwise		<input type="checkbox"/> Stage 3	
	Lamp survival factor at 6000 h :	From 1 March 2014: $\geq 0,50$		$\geq 0,70$	
	Lumen maintenance:	At 2 000 h: $\geq 80 \%$		At 2 000 h: $\geq 83 \%$ At 6 000 h: $\geq 70 \%$	
	Number of switching cycles before failure :	$\geq \frac{1}{2}$ the lamp lifetime expressed in hours $\geq 10'000$ if lamp starting time $> 0,3$ s		\geq lamp lifetime expressed in hours $\geq 30'000$ if lamp starting time $> 0,3$ s	
	Starting time :	$< 2,0$ s		$< 1,5$ s if $P < 10\text{W}$ $< 1,0$ s if $P \geq 10\text{W}$	
	Lamp warm-up time to 60% Φ :	< 40 s or < 100 s for lamps containing mercury in amalgam form		< 40 s or < 100 s for lamps containing mercury in amalgam form	
	Premature failure rate :	$\leq 5,0 \%$ at 500 h		$\leq 5,0 \%$ at 1 000 h	
	Lamp power factor for lamps with integrated control gear :	$\geq 0,50$ if $P < 25$ W $\geq 0,90$ if $P \geq 25$ W		$\geq 0,55$ if $P < 25$ W $\geq 0,90$ if $P \geq 25$ W	

1194/2012/EC				
Clause	Test Item	Requirements		Verdict
	Color rendering (Ra) :	≥ 80 ≥ 65 if the lamp is intended for outdoor or industrial applications according to point 3.1.3(l) of Annex AIII And no lamp is more than 3,9 points below the above required value.		P
	Other directional lamps (excluding LED lamps, compact fluorescent lamps and high-intensity discharge lamps):	<input type="checkbox"/> Stage 1 and 2	<input type="checkbox"/> Stage 3	
	Rated lamp lifetime at 50 % lamp survival	$\geq 1\ 000$ h ($\geq 2\ 000$ h in stage 2) $\geq 2\ 000$ h for extra low voltage lamps not complying with the stage 3 filament lamp efficiency requirement in point 1.1 of Annex III	$\geq 2\ 000$ h $\geq 4\ 000$ h for extra low voltage lamps	
	Lumen maintenance:	≥ 80 % at 75 % of rated average lifetime		
	Number of switching cycles :	\geq four times the rated lamp life expressed in hours		
	Starting time :	$< 0,2$ s		
	Lamp warm-up time to 60% Φ :	$\leq 1,0$ s		
	Premature failure rate :	$\leq 5,0$ % at 100 h	$\leq 5,0$ % at 200 h	
	Lamp power factor for lamps with integrated control gear :	Power > 25 W: $\geq 0,9$ Power ≤ 25 W: $\geq 0,5$		
AIII-2.2	Non-directional and directional LED lamps	Requirement as from stage 1, except where indicated otherwise		
	Lamp survival factor at 6 000 h :	From 1 March 2015: $\geq 0,90$		P
	Lumen Maintenance at 6 000 h :	From 1 March 2015: $\geq 0,80$		P
	Number of switching cycles before failure :	$\geq 15\ 000$ if rated lamp life $\geq 30\ 000$ h otherwise: \geq half the rated lamp life expressed in hours		P
	Starting time :	$< 0,5$ s		P
	Lamp warm-up time to 95% Φ :	< 2 s		P
	Premature failure rate :	≤ 5.0 % at 1000 h		P
	Colour rendering (Ra):	≥ 80 ≥ 65 if the lamp is intended for outdoor or industrial applications in accordance with point 3.1.3(l) of Annex III		P
	Colour consistency:	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.		P

1194/2012/EC			
Clause	Test Item	Requirements	Verdict
	Lamp power factor (PF) for lamps with integrated control gear:	$P \leq 2 \text{ W}$: no requirement $2 \text{ W} < P \leq 5 \text{ W}$: $PF > 0,4$ $5 \text{ W} < P \leq 25 \text{ W}$: $PF > 0,5$ $P > 25 \text{ W}$: $PF > 0,9$	P
AIII-3	Product information requirements for directional lamps from stage 1		N/A
3.1.1	Information to be displayed on the lamp itself	For lamps other than high-intensity discharge lamps, the value and unit ('lm', 'K' and "°") of the nominal useful luminous flux, of the colour temperature and of the nominal beam angle shall be displayed in a legible font on the surface of the lamp if, after the inclusion of safety-related information such as power and voltage, there is sufficient space available for it on the lamp without unduly obstructing the light coming from the lamp.	
3.1.2	Product information on packaging and on free access websites:		
a		Nominal useful luminous flux displayed in a font at least twice as large as any display of the nominal lamp power	
b		Nominal life time of the lamp in hours (not higher than the rated life time)	
c		Colour temperature, as a value in Kelvins and also expressed graphically or in words	
d		Number of switching cycles before premature failure	
e		Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1 second)	
f		A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers; in the latter case a list of compatible dimmers shall be also provided on the manufacturer's website	
g		If designed for optimum use in non-standard conditions (such as ambient temperature $T_a \neq 25 \text{ °C}$ or specific thermal management is necessary), information on those conditions	
h		Lamp dimensions in millimeters (length and diameter)	
i		Nominal beam angle in degrees	
j		If the lamp's beam angle is $\geq 90^\circ$ and its useful luminous flux as defined in point 1.1 of this Annex is to be measured in a 120° cone, a warning that the lamp is not suitable for accent lighting;	

1194/2012/EC			
Clause	Test Item	Requirements	Verdict
k		If the lamp cap is a standardised type also used with filament lamps, but the lamp's dimensions are different from the dimensions of the filament lamp(s) that the lamp is meant to replace, a drawing comparing the lamp's dimensions to the dimensions of the filament lamp(s) it replaces	
l		An indication that the lamp is of a type listed in the first column of Table 6 may be displayed only if the luminous flux of the lamp in a 90° cone (Φ 90°) is not lower than the reference luminous flux indicated in Table 6 for the smallest wattage among the lamps of the type concerned. The reference luminous flux shall be multiplied by the correction factor in Table 7. For LED lamps, it shall be in addition multiplied by the correction factor in Table 8	
m		An equivalence claim involving the power of a replaced lamp type may be displayed only if the lamp type is listed in Table 6 and if the luminous flux of the lamp in a 90° cone (Φ 90°) is not lower than the corresponding reference luminous flux in Table 6. The reference luminous flux shall be multiplied by the correction factor in Table 7. For LED lamps, it shall be in addition multiplied by the correction factor in Table 8. The intermediate values of both the luminous flux and the claimed equivalent lamp power (rounded to the nearest 1 W) shall be calculated by linear interpolation between the two adjacent values.	
n	Lamp mercury content in mg :	Lamp mercury content as X,X mg	
o		Indication of which website to consult in case of accidental lamp breakage to find instructions on how to clean up the lamp debris.	
3.1.3	Information to be made publicly available on free-access websites and in any other form the manufacturer deems appropriate		
a		The information specified in point 3.1.2	
b		Rated power (0,1 W precision);	
c		Rated useful luminous flux	
d		Rated lamp life time	
e		Lamp power factor	
f		Lumen maintenance factor at the end of the nominal life (except for filament lamps)	
g		Starting time (as X,X seconds)	
h		Colour rendering	

1194/2012/EC			
Clause	Test Item	Requirements	Verdict
i		Colour consistency (only for LEDs)	
j		Rated peak intensity in candela (cd)	
k		Rated beam angle	
l		If intended for use in outdoor or industrial applications, an indication to this effect	
m		Spectral power distribution in the range 180-800 nm	
n	If the lamp contains mercury	Instructions on how to clean up the lamp debris in case of accidental lamp breakage	
o		Recommendations on how to dispose of the lamp at the end of its life for recycling in line with Directive 2012/19/EU of the Council.	
A II-3 of 244/2009/EC	Product information requirements on non-directional household lamps from stage 2		
3.1	All information available be free access websites and on packaging		
a		When the nominal lamp power is displayed outside the energy label in accordance with Directive 98/11/EC or 1194/2012/EC, the nominal luminous flux of the lamp shall also be separately displayed in a font at least twice as large as the nominal lamp power display outside the label	
b		Nominal life time of the lamp in hours (not higher than the rated life time)	
c		Number of switching cycles before premature lamp failure)	
d		Color temperature (also expressed as a value in Kelvins)	
e		Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1 second)	
f		A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers)	
g		If designed for optimal use in non-standard conditions (such as ambient temperature $T_a \neq 25\text{ }^{\circ}\text{C}$), information on those conditions)	
h		Lamp dimensions in millimeters (length and diameter)	

1194/2012/EC

Clause	Test Item	Requirements	Verdict		
i		If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1 W) shall be that corresponding in Table 6 to the luminous flux of the lamp contained in the packaging)			
	Rated lamp luminous flux Φ [lm]	Claimed equivalent incandescent lamp power			
	CFL	Halogen	LED and other lamps	[W]	
	125	119	136	15	
	229	217	249	25	
	432	410	470	40	
	741	702	806	60	
	970	920	1055	75	
	1398	1326	1521	100	
	2253	2137	2452	150	
	3172	3009	3452	200	
j		The term 'energy saving lamp' or any similar product related promotional statement about lamp efficacy may only be used if the lamp complies with the efficacy requirements applicable to non-clear lamps in Stage 1 according to Tables 1, 2 and 3			
k		Lamp mercury content in mg			
l		Indication which website to consult in case of accidental lamp breakage to find instructions on how to clean up the lamp debris			
3.2	All information to be made publicly available on free-access websites				
a		The information specified in point 3.1			
b		Rated wattage (0,1 W precision)			
c		Rated (useful) luminous flux			
d		Rated lamp life time			
e		Lamp power factor			
f		Lumen maintenance factor at the end of the nominal life			
g		Starting time (as X,X seconds)			
h		Colour rendering			

1194/2012/EC			
Clause	Test Item	Requirements	Verdict
i	If the lamp contains mercury	Instructions on how to clean up the lamp debris in case of accidental lamp breakage	
j		Recommendations on how to dispose of the lamp at its end of life	

Appendix I : Test Results

Table 1: Initial Test Results:

Test Results												P
Sample No	Test Voltage (V)	Test Current (A)	lamp Wattage (W)	Power factor	Total Lumen(LM)	Beam angle (°)	CRI	CCT (K)	chromaticity		Colour onsistency (SDCM)	EEI test
									x	y		
1	230	0.178	39.5	0.965	4014	117	80.9	5921	0.3249	0.335	3.6	0.147
2	230	0.177	39.54	0.971	4015.1	118	80.2	5881	0.3278	0.3367	3.7	0.148
3	230	0.1786	39.37	0.958	3979	117	80.6	5908	0.3228	0.3354	3.6	0.148
4	230	0.1791	39.82	0.967	4017.3	116.3	80.1	5974	0.324	0.3334	3.7	0.149
5	230	0.1786	39.84	0.97	3999.4	117.6	80.1	5953	0.3232	0.3373	3.7	0.149
6	230	0.1767	39.16	0.964	4006.5	117.2	81.4	5901	0.3239	0.3377	3.5	0.146
7	230	0.1776	39.43	0.965	4020.4	116.5	81.5	5976	0.3248	0.3381	3.6	0.147
8	230	0.1791	39.42	0.957	4021.4	117.5	80.7	5884	0.3253	0.3368	3.7	0.147
9	230	0.1766	39.76	0.979	4036.1	117.3	81.1	5935	0.3265	0.3326	3.5	0.148
10	230	0.1794	39.26	0.951	4046.6	117.3	80.3	5970	0.3223	0.3344	3.6	0.145
11	230	0.1791	39.35	0.955	4028.1	116.7	81.7	5950	0.3272	0.3379	3.6	0.146
12	230	0.1793	39.64	0.961	3987.8	116.5	80.7	5923	0.3218	0.3365	3.7	0.149
13	230	0.1775	39.41	0.965	4011	117.4	80.1	5960	0.3223	0.3328	3.7	0.147
14	230	0.1767	39.88	0.981	3990.4	117.8	80.2	5967	0.326	0.3364	3.6	0.15
15	230	0.179	39.17	0.951	3979.6	116.2	80.7	5974	0.3251	0.3347	3.7	0.147
16	230	0.1779	39.51	0.966	3977.5	116.4	81.2	5893	0.3232	0.3332	3.6	0.149
17	230	0.1796	39.28	0.951	4021	117.3	80.8	5905	0.3264	0.3333	3.7	0.146
18	230	0.1794	39.57	0.959	3999.7	116	81.1	5961	0.327	0.336	3.6	0.148
19	230	0.1778	39.7	0.971	4002.3	118	81	5970	0.3227	0.3359	3.5	0.149
20	230	0.179	39.63	0.963	4037.7	116.6	80.7	5940	0.3269	0.3371	3.7	0.147
Average	230	0.1792	39.33	0.954	3992.1	115.8	81.6	5955	0.3268	0.332	3.5	0.148

Table 2: Test Result of Starting Time and Warm-up Time:

		Test Results										P
Starting time (s)	Sample No.	1	2	3	4	5	6	7	8	9	10	
	Test results	0,016	0,016	0,011	0,019	0,015	0,015	0,01	0,013	0,014	0,011	
	Sample No.	11	12	13	14	15	16	17	18	19	20	
	Test results	0,016	0,009	0,015	0,016	0,016	0,014	0,01	0,009	0,016	0,016	
	Average	0,041										
Warm up time (s) (to <input checked="" type="checkbox"/> 95% or <input type="checkbox"/> 60% full light)	Sample No.	1	2	3	4	5	6	7	8	9	10	
	Test results	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	
	Sampl No.	11	12	13	14	15	16	17	18	19	20	
	Test results	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	<1s	
	Average	<1s										
<p>Remark: Starting time tested at 92% of the rated voltage. The lamp belongs to "Instant full light" type</p>												

Table 3: Test Result of Number of Switching cycles:

Sample No										P
	2000	4000	6000	8000	10000	12000	14000	15000		
21	X	X	X	X	X	X	X	X		
22	X	X	X	X	X	X	X	X		
23	X	X	X	X	X	X	X	X		
24	X	X	X	X	X	X	X	X		
25	X	X	X	X	X	X	X	X		
26	X	X	X	X	X	X	X	X		
27	X	X	X	X	X	X	X	X		
28	X	X	X	X	X	X	X	X		
29	X	X	X	X	X	X	X	X		
30	X	X	X	X	X	X	X	X		
31	X	X	X	X	X	X	X	X		
32	X	X	X	X	X	X	X	X		
33	X	X	X	X	X	X	X	X		
34	X	X	X	X	X	X	X	X		
35	X	X	X	X	X	X	X	X		
36	X	X	X	X	X	X	X	X		
37	X	X	X	X	X	X	X	X		
38	X	X	X	X	X	X	X	X		
39	X	X	X	X	X	X	X	X		
40	X	X	X	X	X	X	X	X		

Note: "X" means the lamp still burning when the cycles reached. "F" means the lamp failure when the cycles reached.

Table 4: Test Result of Lamp premature failure, Lumen maintenance & Lamp survival factor:

Sample No	Test Voltage (V)	Test Results								N/A	
		ϕ_{total} (lm)		ϕ_{total} (lm)			Lumen Maintenance			Premature failure rate	lamp survival factor
		Initial	2000 H	6000 H	At 75% of rated average lifetime	2000 H	6000 H	At 75% of rated average	At 1000 H	At 6000 H	
1	230	4014	3941.7	3861.5		98.20%	96.20%		X	X	
2	230	4015.1	3979	3826.4		99.10%	95.30%		X	X	
3	230	3979	3895.4	3847.7		97.90%	96.70%		X	X	
4	230	4017.3	3945	3892.8		98.20%	96.90%		X	X	
5	230	3999.4	3959.4	3823.4		99.00%	95.60%		X	X	
6	230	4006.5	3950.4	3850.2		98.60%	96.10%		X	X	
7	230	4020.4	3956.1	3831.4		98.40%	95.30%		X	X	
8	230	4021.4	3985.2	3908.8		99.10%	97.20%		X	X	
9	230	4036.1	3931.2	3906.9		97.40%	96.80%		X	X	
10	230	4046.6	4010.2	3888.8		99.10%	96.10%		X	X	
11	230	4028.1	3951.6	3879.1		98.10%	96.30%		X	X	
12	230	3987.8	3928	3796.4		98.50%	95.20%		X	X	
13	230	4011	3922.8	3882.6		97.80%	96.80%		X	X	
14	230	3990.4	3950.5	3862.7		99.00%	96.80%		X	X	
15	230	3979.6	3908	3808.5		98.20%	95.70%		X	X	
16	230	3977.5	3929.8	3822.4		98.80%	96.10%		X	X	
17	230	4021	3964.7	3864.2		98.60%	96.10%		X	X	
18	230	3999.7	3927.7	3859.7		98.20%	96.50%		X	X	
19	230	4002.3	3946.3	3858.2		98.60%	96.40%		X	X	
20	230	4037.7	3993.3	3868.1		98.90%	95.80%		X	X	
Average	230	4009.545	3948.815	3856.99		98.49%	96.20%		X	X	

Note: "X" means the lamp still burning when the hours reached. "F" means the lamp failure when the hours reached.

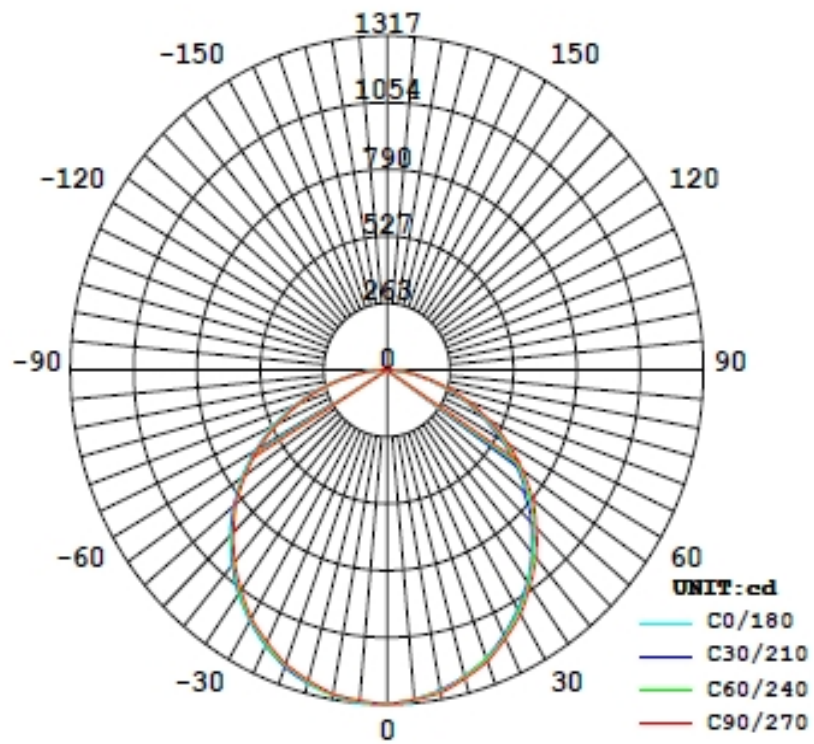
Table 5: Energy Class

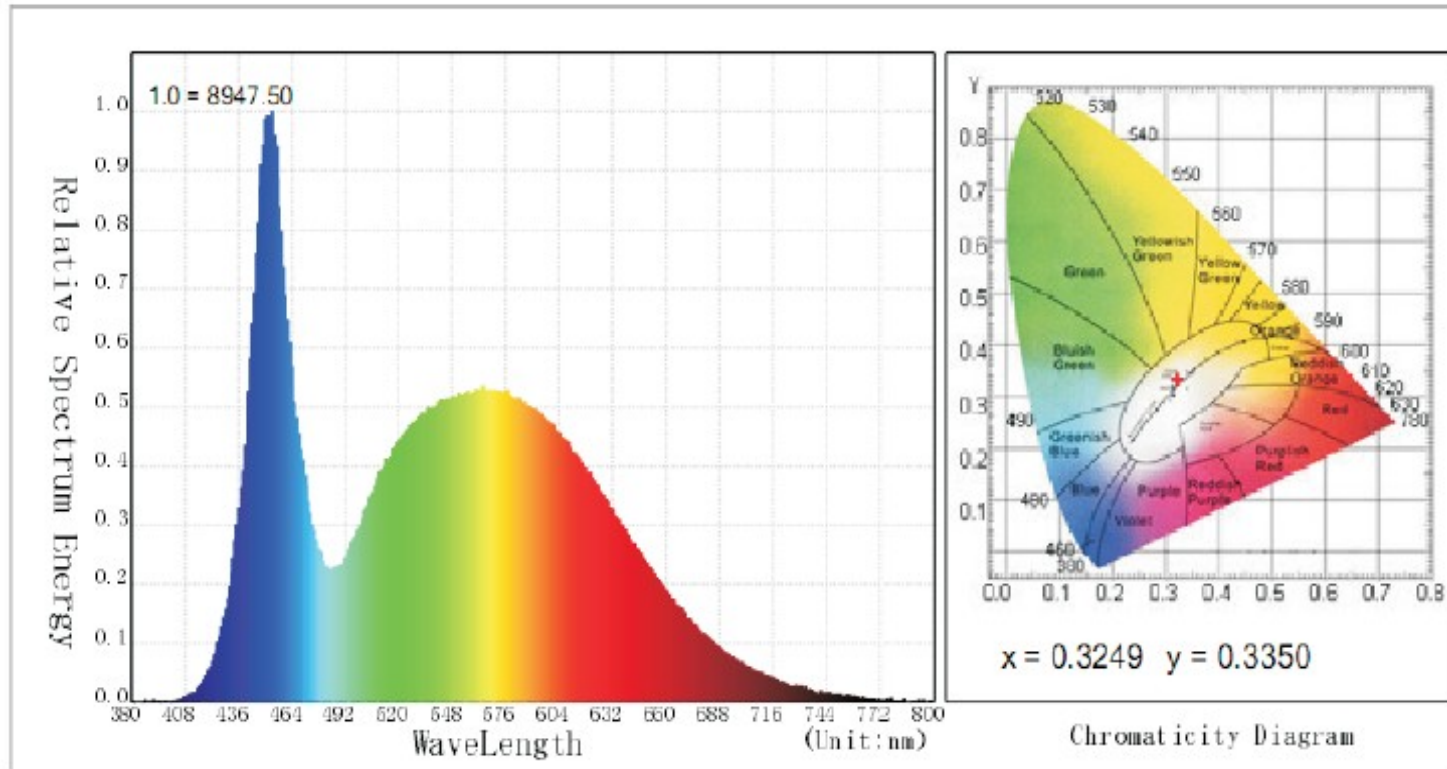
EEI= P_{cor}/P_{ref} (based on rated value)		
Energy efficiency index (EEI) for non-directional lamps	Energy efficiency index (EEI) for directional lamps	Energy efficiency class
$EEI \leq 0,11$	$EEI \leq 0,13$	CLASS A++ (most efficient)
$0,11 < EEI \leq 0,17$	$0,13 < EEI \leq 0,18$	CLASS A+
$0,17 < EEI \leq 0,24$	$0,18 < EEI \leq 0,40$	CLASS A
$0,24 < EEI \leq 0,60$	$0,40 < EEI \leq 0,95$	CLASS B
$0,60 < EEI \leq 0,80$	$0,95 < EEI \leq 1,20$	CLASS C
$0,80 < EEI \leq 0,95$	$1,20 < EEI \leq 1,75$	CLASS D
$EEI > 0,95$	$EEI > 1,75$	CLASS E (least efficient)

EEI= P_{cor}/P_{ref} (based on tested value)		
Energy efficiency index (EEI) for non-directional lamps	Energy efficiency index (EEI) for directional lamps	Energy efficiency class
$EEI \leq 0,11$	$EEI \leq 0,13$	CLASS A++ (most efficient)
$0,11 < EEI \leq 0,17$	$0,13 < EEI \leq 0,18$	CLASS A+
$0,17 < EEI \leq 0,24$	$0,18 < EEI \leq 0,40$	CLASS A
$0,24 < EEI \leq 0,60$	$0,40 < EEI \leq 0,95$	CLASS B
$0,60 < EEI \leq 0,80$	$0,95 < EEI \leq 1,20$	CLASS C
$0,60 < EEI \leq 0,80$	$1,20 < EEI \leq 1,75$	CLASS D
$EEI > 0,95$	$EEI > 1,75$	CLASS E (least efficient)

Appendix II: Luminous Intensity Distribution (Sample 1#)

LUMINOUS INTENSITY DISTRIBUTION





Appendix IV: List of Equipment Used

Registration No	Equipment name	Model No	Specifications	Manufacturer
SH 438	Goniophotometers	GO-R5000-SML	scale A zero position: 119577; $\leq \pm 0.1^\circ$	EVERFINE
SH 441	Standard light source	D908	I:6.979A(DC);U=82.7V; T c=2788 K; ϕ =8867.0 lm	EVERFINE
SH 442	Digital power meter	PF2010A	Class 0.05;Voltage 0~600V,Current 0~20A;F:45~500Hz	EVERFINE
SH 443	Digital CC&CV DC power supply	WY12010	Class 0.03;Vrms:2.5mV;Irms: 2 mA;current:0~10A;Watt: 1000VA;Max voltage 120V Max current 10A	EVERFINE
SH 444	Intelligent AC power source	DPS1060	Voltage 0~300V, $\leq 0.2\%$;Current 0~54A;Watt 6KVA;F 45~65Hz, $\leq 0.03\%$.	EVERFINE
SH 445	High accuracy array spectroradiometer	HAAS-2000	Class 1;wavelength 380nm~780nm	EVERFINE
SH 225	Oscillograph	WS42XS	input:90-264Vrms / 47~63 Hz /15A-500A	LeCroy
SH 324	Integrating Sphere	2,0m	2,0m	EVERFINE
SH 326	Digital power meter	PF2010A	Class 0.05;Voltage 0~600V,Current 0~20A;F:45~500Hz	EVERFINE
SH 327	Digital CC&CV DC power supply	WY305	150VA; 0~30V; 0~5A/ Classe 0.05	EVERFINE
SH 328	Plus UV-VIS-Near IR spectrophoto colorimeter	PMS-80	380-800nm	EVERFINE
SH 329	Intelligent Pure Sine-wave Power Supply	TPS-500B	500W / 4.2A or 2.1A	EVERFINE
SH330B	Standard Light Source	D204	I: 3.954A; U: 21.4V; Tc: 2856 K; ϕ : 1328.7 lm	EVERFINE
SH 359	Photometric Detector	15395	380nm-800nm	BENTHAM
SH 344	Monochromatror	IDR 300	200(180)nm-3000nm	BENTHAM

Appendix V: Model List:

No	Image	Item	Model	Lamp base cap	Rated voltage	Rated Wattage (0.1W)	Light Color	Rated useful Lumen (lm)	CCT (K)	Color Rendering	Rated Life (h)	Dimension of lamp (L x Dia mm)	Rated Beam Angle (°)	EEI test	Lumen Maintenance		switch survival factor		Declared New Energy Class
															2000H	6000H	6000	15000	
1		TLP-F-3030	TLP-F-3030		100-240V 50/60Hz	18.6 W	CW	1522 lm	5983k	>80.3	50000h	30X30	117	0.1831	98.10%	97.60%	100.0%	100.0%	A
							NW	1431 lm	4109k	>80.9				0.1948	97.13%	96.63%	100.0%	100.0%	A
							WW	1355 lm	3012k	>80.1				0.2057	96.18%	95.69%	100.0%	100.0%	A
2		TLP-F-3060	TLP-F-3060		100-240V 50/60Hz	41.2 W	CW	3448 lm	5983k	>80.3	50000h	30X60	115	0.179	98.10%	97.60%	100.0%	100.0%	A
							NW	3241 lm	4109k	>80.9				0.1905	97.13%	96.63%	100.0%	100.0%	A
							WW	3069 lm	3012k	>80.1				0.2012	96.18%	95.69%	100.0%	100.0%	A
3		TLP-F-6060	TLP-F-6060		100-240V 50/60Hz	41.1 W	CW	3886 lm	5983k	>80.3	50000h	60X60	116	0.1585	98.10%	97.60%	100.0%	100.0%	A+
							NW	3836 lm	4109k	>80.9				0.1605	97.13%	96.63%	100.0%	100.0%	A+
							WW	3436 lm	3012k	>80.1				0.1792	96.18%	95.69%	100.0%	100.0%	A
4		TLP-X-6060	TLP-X-6060		100-240V 50/60Hz	39.5 W	CW	4016 lm	5983k	>80.3	50000h	60X60	117	0.1474	98.10%	97.60%	100.0%	100.0%	A+
							NW	3895 lm	4109k	>80.9				0.152	97.13%	96.63%	100.0%	100.0%	A+
							WW	3503 lm	3012k	>80.1				0.169	96.18%	95.69%	100.0%	100.0%	A+

5	TLP-F-6262	TLP-F-6262	100-240V 50/60Hz	42.5 W	CW	3921 lm	5983k	>80.3	50000h	62X62	117	0.1624	98.10%	97.60%	100.0%	100.0%	A+
					NW	3855 lm	4109k	>80.9				0.1652	97.13%	96.64%	100.0%	100.0%	A+
					WW	3510 lm	3012k	>80.1				0.1814	96.18%	95.69%	100.0%	100.0%	A
5	TLP-F-3012	TLP-F-3012-40	100-240V 50/60Hz	42.1 W	CW	3526 lm	5983k	>80.3	50000h	30X120	117	0.1789	98.10%	97.60%	100.0%	100.0%	A
					NW	3385 lm	4109k	>80.9				0.1864	97.13%	96.64%	100.0%	100.0%	A
					WW	3222 lm	3012k	>80.1				0.1958	96.18%	95.69%	100.0%	100.0%	A
6	TLP-F-3012	TLP-F-3012-76	100-240V 50/60Hz	78.3 W	CW	6381 lm	5983k	>80.3	50000h	30X120	116	0.1839	98.10%	97.60%	100.0%	100.0%	A
					NW	5998 lm	4109k	>80.9				0.1956	97.13%	96.64%	100.0%	100.0%	A
					WW	5679 lm	3012k	>80.1				0.2066	96.18%	95.69%	100.0%	100.0%	A
7	TLP-F-6012	TLP-F-6012-76	100-240V 50/60Hz	78.2 W	CW	6516 lm	5983k	>80.3	50000h	60X120	116	0.1798	98.10%	97.60%	100.0%	100.0%	A
					NW	6060 lm	4109k	>80.9				0.1934	97.13%	96.64%	100.0%	100.0%	A
					WW	5669 lm	3012k	>80.1				0.2067	96.18%	95.69%	100.0%	100.0%	A