

EMC test

General information

Subject : VOLTANA 2 - 16 led's Philips 75 W driver Class I

Asked by : PELBÁRT Péter

Created on : 07/02/2019

Test number : D190099

Reference norm : EN 55015 - EN 61547 Standards

Sample(s) : E180608

Folder : P-F14058

Test conditions

Luminaire : VOLTANA 2

Operator : External Lab

Description :

16 led's

Dimmable: DALI

Electrical class : Class I EU

Driver : Xitanium FP 75W 0.3-1.0A SNLDAE 230V C133 sXt / 00-49-490

Current setting (mA) : 1000

Auxiliaries : VS Lighting Solutions SPC3

Testing facility : External - EMC - Laborelec

External test report reference : LBE04134694 - 1.0

Conclusion



Success

VOLTANA 2 16 led's Class I with PHILIPS 75 W driver complies with EN 55015 & EN 61547 Standards.

Validated by :

LERHO Xavier

Duplicate to : PELBÁRT Péter, HORVÁTH Csaba, BEDŐ

Péter, BOS Peter

LAB : 07/02/2019

D190099

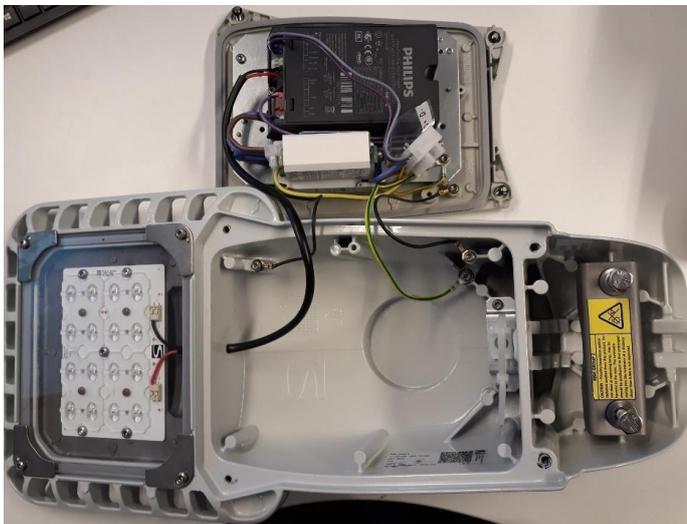
1/26

Summary of test

Test(s)

Name	Description	Result
Complete EMC test (10 Kv Surges)	<p>Emission measurements (EN 55015):</p> <ul style="list-style-type: none"> - Terminal disturbance - Radiated emissions - Conducted emissions <p>Harmonics (IEC/EN 61000-3-2)</p> <p>Immunity measurements (IEC/EN 61547)</p> <ul style="list-style-type: none"> - Electrostatic discharge (IEC/EN 61000-4-2) - Radiated, radio frequency electromagnetic field (IEC/EN 61000-4-3) - Fast transients (IEC/EN 61000-4-4) - Surges (IEC/EN 61000-4-5) - Injected currents (IEC/EN 61000-4-6) - Power frequency magnetic field immunity (IEC/EN 61000-4-8) - Voltage dips & interruptions (IEC/EN 61000-4-11) 	Success

Complete EMC test (10 Kv Surges)



V1



V2

**CENTRAAL LABORATORIUM VOOR ELEKTRICITEIT (C.L.E.)
LABORATOIRE CENTRAL D'ELECTRICITE (L.C.E.)**

Rodestraat, 125 – B-1630 Linkebeek

Electromagnetic Compatibility

TEST REPORT

Purpose of the test	Measurement of radio-disturbances and examination of compliance with EMC standards.
Trademark and type	R-Tech Voltana 2 (Philips) 75W CI I Dimmable
Delivered to	R-TECH M. Maghe Laurent Rue de Mons, 3 B – 4000 LIEGE
Performed on	30/01/2019 – 01/02/2019
Delivered on	04/02/2019
CLE task No.	18/18073
CLE report No.	LBE04134694 - 1.0
Contents	24 pages
Applicant reference No.	Order PO002817 of 09/11/2018

<i>Author</i>	<i>Verifier</i>	<i>Approver</i>
Fonck Yves <i>Technical Operator</i> 	Herbert Denis <i>Technical Operator</i> 	Deswert Jean Michel <i>Technology Manager</i> 

This report concerns type tests on one or a series of specimens
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A. Specifications of the Equipment Under Test

The accuracy of the description and identification of the equipment under test, it's operating conditions, modifications and monitoring of its behaviour during and or after the test performed by Laborelec are under the responsibility of the customer.

Product name: Led's Luminaire
Type: Voltana 2
Manufacturer: R-Tech SA
Trademark: Schröder

Number of samples: 1
CLE Number: 18/180608/1
Date of entrance: 09/11/2018

Specifications:

Driver: Philips Xitanium
Xi FP 75W 0.3-1.0A SNLDAE 230V C133 sXt
929001485
 U_{in} : 220 – 240 V
 I_{in} : 0,4 – 0,34 A
 P_f : 0,95
 U_{out} : 35 – 108 V
 I_{out} : 300 – 1050 mA
 P_{out} : 75 W
 T_c : 80°C
 T_a : -40°... +55°C

Surge Protector Device: VS Lighting Solutions SPC3/230/10K/i
 U_{in} : 100 - 277 V / 50 - 60 Hz
 U_{oc} : 10 kV
 U_c : 305 Vac
 U_{pL-N} : ≤ 1,5 kV
 U_{pL-PE} : ≤ 1,8 kV
 I_L : 16 A

Dimming protocol: Dali

All tests have been practiced on sample 18/180608/1.
Pictures of the appliance are given in appendix 1.

B. Program of the tests

Program

Tests, or verification by other means, of compliance with the EMC standards CISPR 15 / EN 55015 (radio-interference), IEC 61000-3-2 / EN 61000-3-2 (harmonics), IEC 61000-3-3 / EN 61000-3-3 (voltage fluctuations) and IEC 61547 / EN 61547 (immunity of electrical lighting equipment).

All EMC tests against the above mentioned standards are covered by the quality system EN ISO 17025.

Reference documents:

EMC standards:	CISPR 15	(2013) + A1 (2015)
	IEC 61000-3-2	(2014)
	IEC 61000-3-3	(2013) + A1 (2017)
	IEC 61547	(2009)
	EN 55015	(2013) + A1 (2015)
	EN 61000-3-2	(2014)
	EN 61000-3-3	(2013)
	EN 61547	(2009)

Supplier:

None, all tests and measurements have been performed at Laborelec.

C. Methods

C.1. Radio-interference measurements according to CISPR 15 / EN 55015

Disturbance voltages are measured at the terminals of the 50 μ H/50 Ω artificial mains network from 9 kHz to 30 MHz (between each conductor L or N and earth) with a CISPR radio-receiver.

Method of measurement following pt. 8.1.4.1 of CISPR 15 / EN 55015:

- For light regulating controls which regulate the light output via a ballast or convertor, then the disturbance voltage at the mains and control terminals, if any, shall be measured at the maximum and minimum light output levels.

From 9 kHz to 30 MHz, the radiated electromagnetic disturbances are measured by means of 2 m loop antennas and a CISPR radio-receiver.

Conducted RF emission is measured at the RF output of a coupling / decoupling network (CDN-M2 or CDN-M3, EN/IEC 61000-4-6 compliant) from 30 MHz to 300 MHz with a CISPR radio-receiver.

Method of measurement following pt. 9.1.4. of CISPR 15 / EN 55015:

If the lighting equipment incorporates a light-regulating control or is controlled by an external device, the radiated electromagnetic disturbance shall be determined in the following way:

- For light regulating controls which regulate the light output via a ballast or convertor, measurements shall be performed at maximum and minimum light output levels.

Those methods and the instrumentation used are in accordance with CISPR 15 / EN 55015 and CISPR 16 / EN 55016.

C.2. Harmonics according to IEC / EN 61000-3-2

Where needed, the harmonics of the mains supply input current are measured by means of a resistive shunt and a wave analyser.

Method of measurement following pt. C.5.3. of IEC 61000-3-2 / EN 61000-3-2:

If a luminaire has a built-in dimming device, the harmonic currents shall be measured at the maximum load of the lamps as specified by the manufacturer. The setting of the dimming device is varied in five equidistant steps between the minimum and the maximum power in order to obtain comprehensive results.

C.3. Voltage fluctuations according to IEC / EN 61000-3-3

Voltage fluctuations are assessed by direct measurement at the terminals of the equipment under test using a flicker-meter, which complies with the specifications given in IEC / EN 61000-4-15.

C.4. Immunity according to IEC 61547 / EN 61547

Tests are carried out on the accessible parts of the appliance or on the mains supply, during normal operation of the appliance.
Test methods and the instrumentation used are in accordance with the basic standards that are referred to in the tables of this standard.

Conditions during testing following pt. 8. of IEC 61547-1 / EN 61547-1:

An EUT including a light-regulating control should be tested at a light output level of 50 % \pm 10 % from the maximum light output. If a light output level of 50 % is not available for the EUT including a light regulation function, the test shall be done at the level which is closest to 50 %. If two steps equally distant to 50 % are available, the lower level (<50 % shall be used for the test)

D. Results

D.1. Radio-interference measurements between 0,009 and 30 MHz

The table below gives the results of terminal voltages between each input conductor (L or N) and earth in dB with reference to 0 dB corresponding to 1 μ V.

Unless otherwise specified, the test voltage is 230 V - 50 Hz.

It is checked that radio-interference does not exceed the limits in a frequency range between 0,15 and 30 MHz.

D.1.1. Complete scan at full light output:

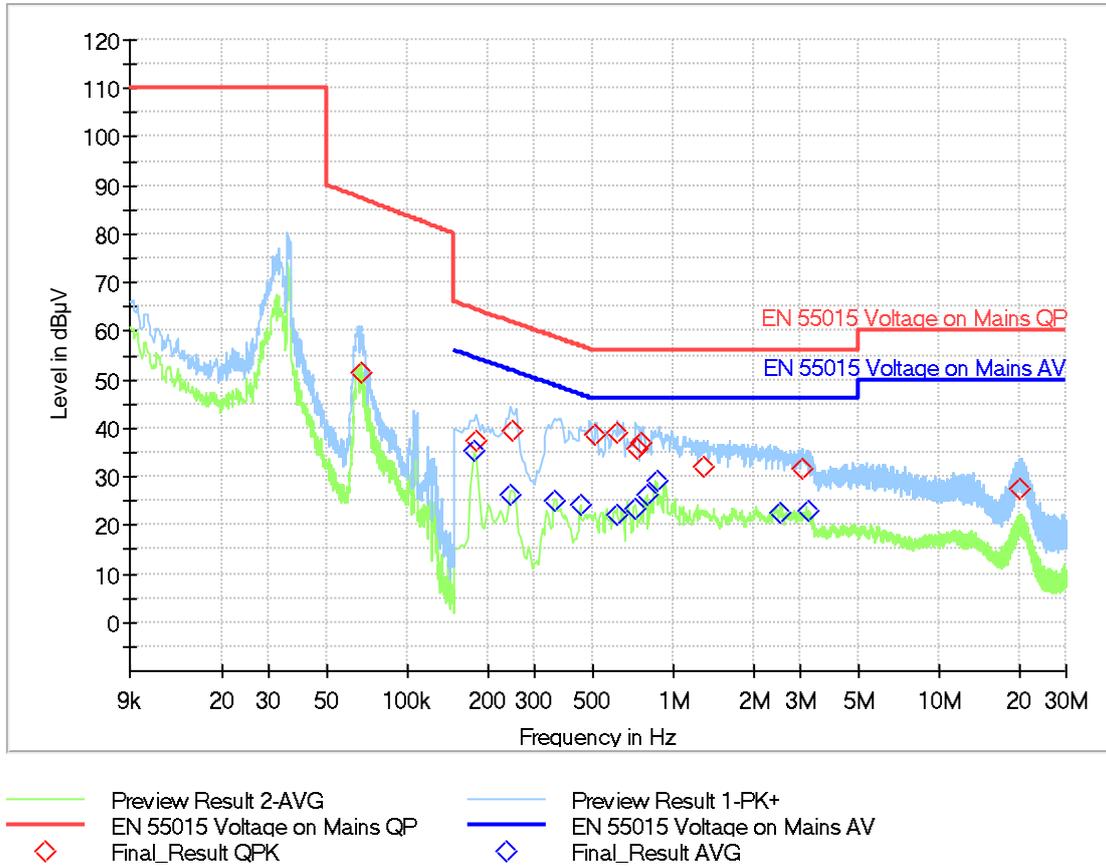
D.1.1.1. Measurements:

Results of the final analysis with quasi-peak and average detectors are given only at the most critical levels.

Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Exceed (Yes/No)	Meas. Time (s)	PE	Line
0.0667	51.38	---	87.38	No	1.00	GND	N
0.1770	---	35.24	54.63	No	1.00	GND	L1
0.1815	37.50	---	64.42	No	1.00	GND	N
0.2445	---	26.39	51.94	No	1.00	GND	N
0.2490	39.58	---	61.79	No	1.00	GND	L1
0.3570	---	25.19	48.80	No	1.00	GND	N
0.4470	---	24.17	46.93	No	1.00	GND	N
0.5100	38.80	---	56.00	No	1.00	GND	L1
0.6090	---	22.30	46.00	No	1.00	GND	L1
0.6135	38.91	---	56.00	No	1.00	GND	L1
0.7125	---	23.62	46.00	No	1.00	GND	L1
0.7350	35.89	---	56.00	No	1.00	GND	L1
0.7620	36.90	---	56.00	No	1.00	GND	L1
0.7935	---	26.42	46.00	No	1.00	GND	L1
0.8655	---	29.16	46.00	No	1.00	GND	N
1.3020	32.21	---	56.00	No	1.00	GND	N
2.5350	---	22.53	46.00	No	1.00	GND	L1
3.0570	31.54	---	56.00	No	1.00	GND	L1
3.1965	---	22.92	46.00	No	1.00	GND	L1
20.2290	27.35	---	60.00	No	1.00	GND	L1

D.1.1.2. Graphical representation of the test results



Ambient temperature: 20°C

D.1.2. Complete scan at minimum light output:

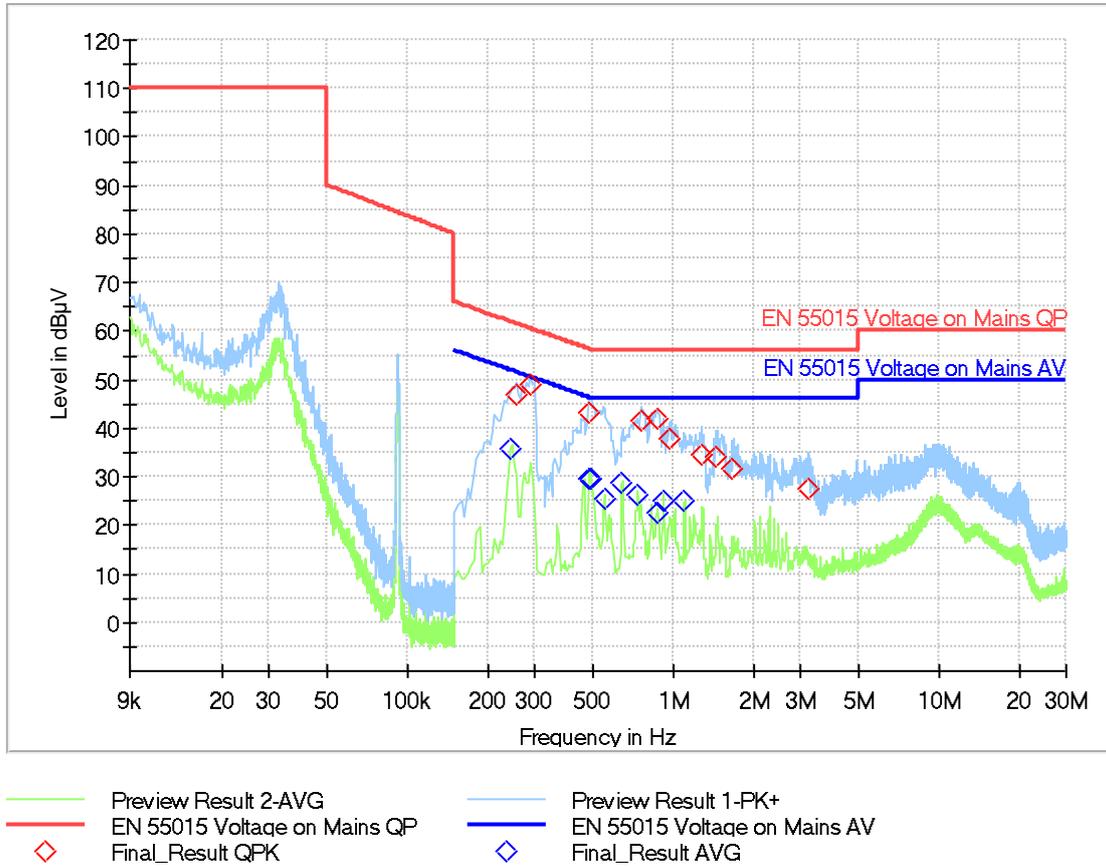
D.1.2.1. Measurements:

Results of the final analysis with quasi-peak and average detectors are given only at the most critical levels.

Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Exceed (Yes/No)	Meas. Time (s)	PE	Line
0.2445	---	35.73	51.94	No	1.00	GND	N
0.2580	47.03	---	61.50	No	1.00	GND	N
0.2895	48.84	---	60.54	No	1.00	GND	N
0.4785	43.16	---	56.37	No	1.00	GND	L1
0.4830	---	29.71	46.29	No	1.00	GND	N
0.4875	---	29.41	46.21	No	1.00	GND	N
0.5505	---	25.45	46.00	No	1.00	GND	L1
0.6405	---	28.96	46.00	No	1.00	GND	L1
0.7350	---	26.41	46.00	No	1.00	GND	N
0.7620	41.78	---	56.00	No	1.00	GND	N
0.8655	41.89	---	56.00	No	1.00	GND	L1
0.8700	---	22.66	46.00	No	1.00	GND	L1
0.9150	---	25.26	46.00	No	1.00	GND	N
0.9690	37.97	---	56.00	No	1.00	GND	N
1.0995	---	24.88	46.00	No	1.00	GND	L1
1.2795	34.51	---	56.00	No	1.00	GND	L1
1.4505	34.24	---	56.00	No	1.00	GND	N
1.6710	31.85	---	56.00	No	1.00	GND	N
3.2010	27.56	---	56.00	No	1.00	GND	L1

D.1.1.2. Graphical representation of the test results



Ambient temperature: 20°C

D.2. Radiated electromagnetic disturbance measurements from 9 kHz to 30 MHz

The table gives the radiated electromagnetic disturbance measurements of the appliance measured by 2 m loop antennas and a radio-receiver (with quasi-peak detector) according to CISPR 15 and CISPR 16.

It is checked that the radiated electromagnetic disturbance is well below the CISPR 15 / EN 55015 limits when a quasi-peak detector is used.

Unless otherwise specified the test voltage is 230 V - 50 Hz.

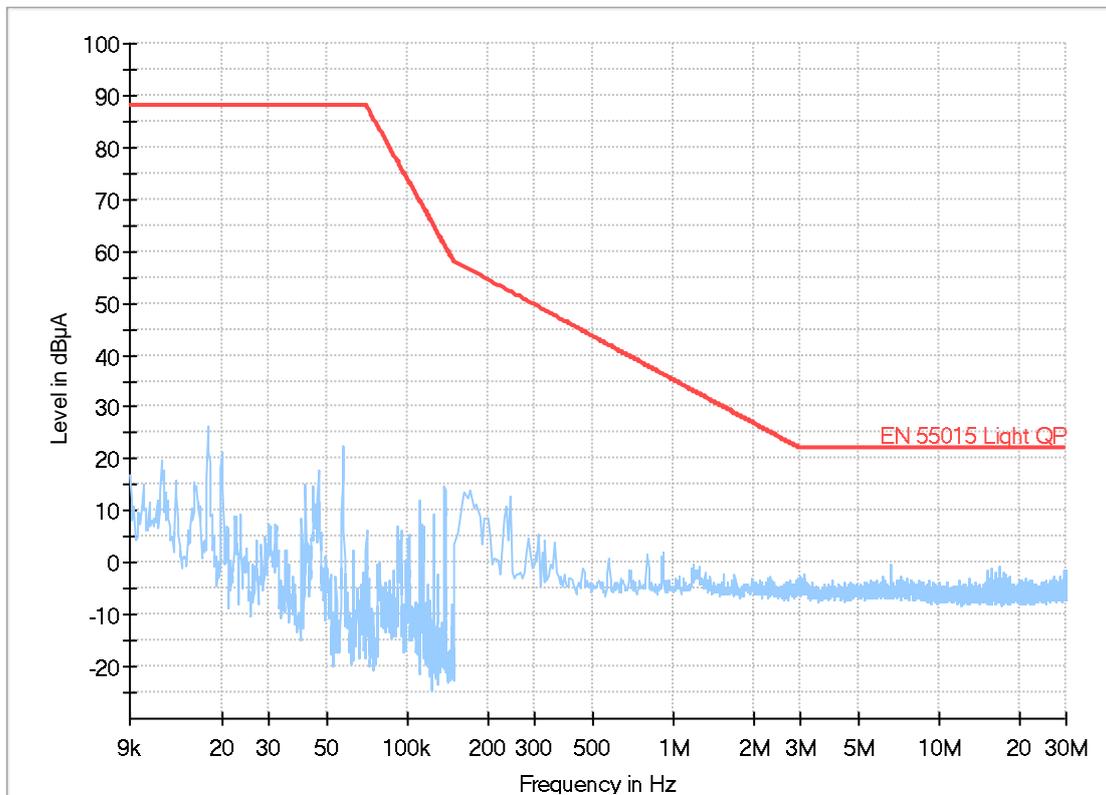
D.2.1. Measurements at maximum light output level

D.2.1.1. Measurements

Quasi-Peak Measurements

No final analysis with Quasi-Peak detector because the measured levels are 30 dB μ V below the limits

D.2.1.2. Graphical representation of the test results



— Preview Result 1-PK+ — EN 55015 Light QP ◇ Final_Result QPK

Ambient temperature: 22°C

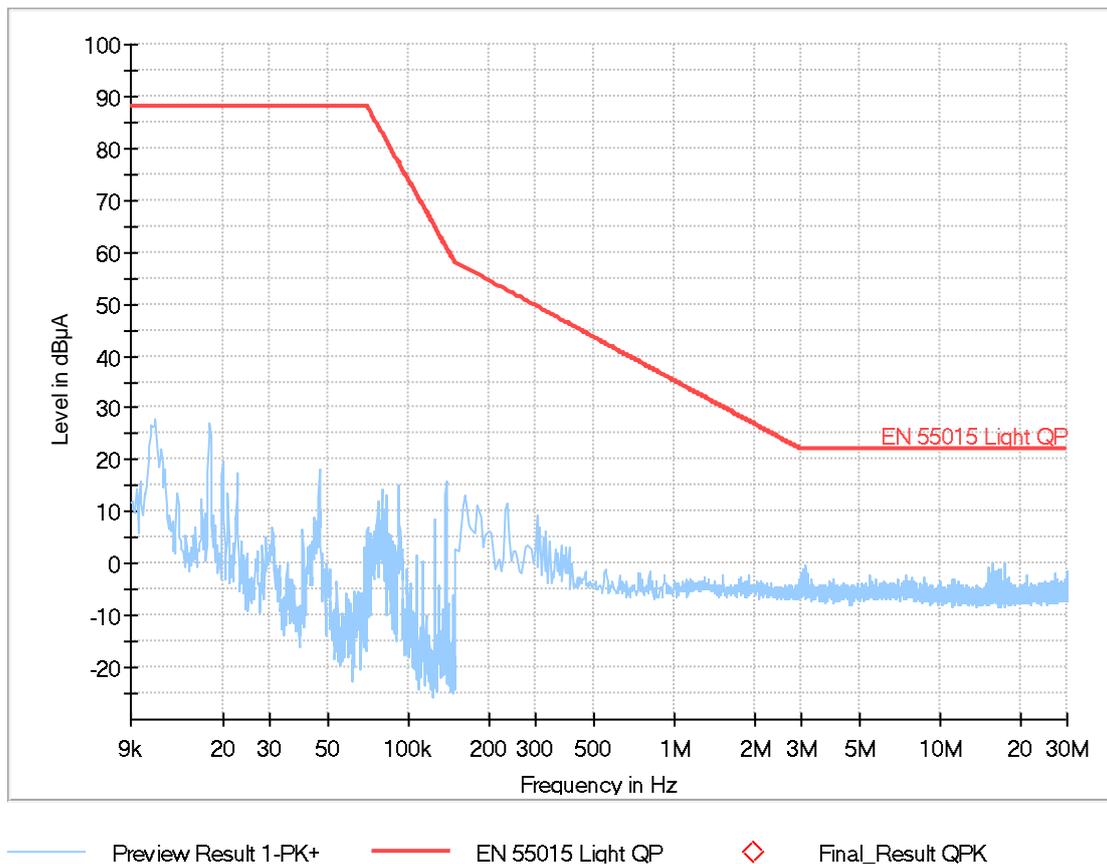
D.2.2. Measurements at minimum light output level

D.2.2.1. Measurements

Quasi-Peak Measurements

No final analysis with Quasi-Peak detector because the measured levels are 30 dB μ V below the limits

D.2.2.2. Graphical representation of the test results



Ambient temperature: 21°C

D.3. Measurements of the Conducted RF emission

The table gives the conducted RF disturbance measurements of the appliance measured through a coupling / decoupling network (CDN-M2 or CDN-M3, EN/IEC 61000-4-6 compliant) from 30 MHz to 300 MHz with a CISPR radio-receiver (with quasi-peak detector) according to CISPR 15 and CISPR 16.

It is checked that the conducted RF disturbance is well below the EN 55015 limits when a quasi-peak detector is used.

Unless otherwise specified the test voltage is 230 V - 50 Hz.

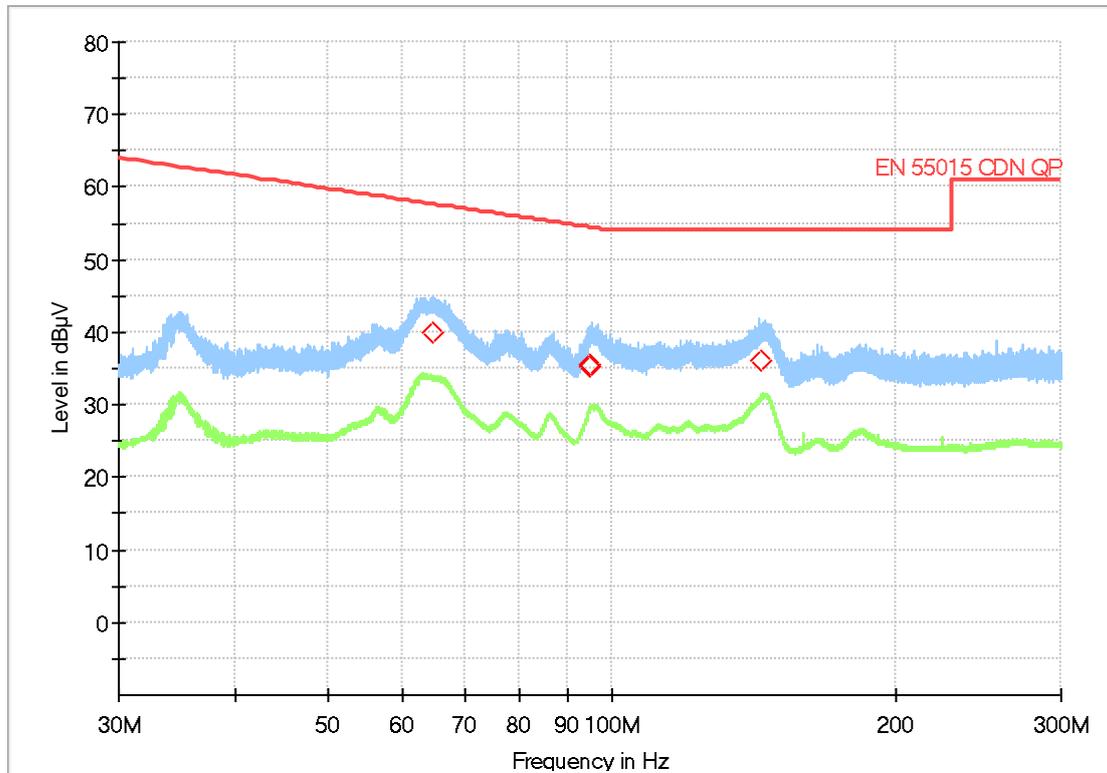
D.3.1. Measurements at maximum light output level

D.3.1.1. Measurements

Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dB μ V)	Limit (dB μ V)	Exceed (Yes/No)	Meas. Time (s)
64.7880	39.98	57.61	No	1.00
94.7715	35.29	54.45	No	1.00
95.0280	35.62	54.42	No	1.00
143.8215	36.17	54.00	No	1.00

D.3.1.2. Graphical representation of the test results



- Preview Result 2-AVG
- EN 55015 CDN QP
- Preview Result 1-PK+
- Final_Result QPK

Ambient temperature: 20°C

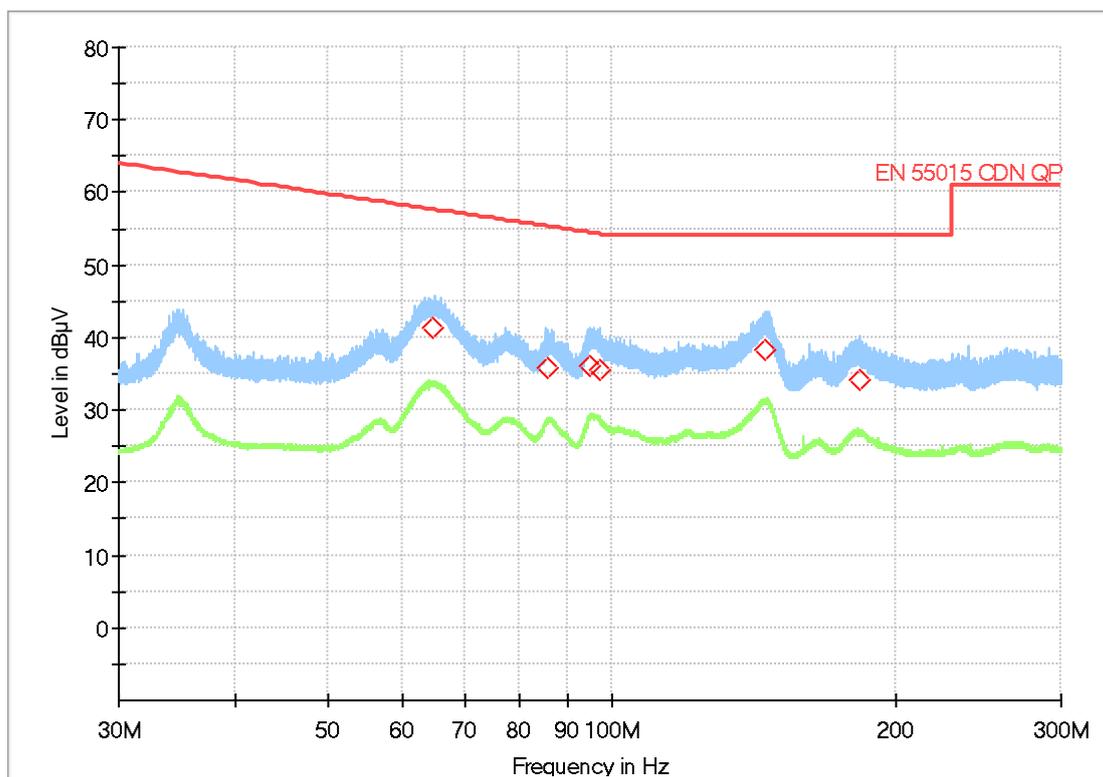
D.3.2. Measurements at minimum light output level

D.3.2.1. Measurements

Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBμV)	Limit (dBμV)	Exceed (Yes/No)	Meas. Time (s)
64.5990	41.36	57.63	No	1.00
85.6275	35.70	55.29	No	1.00
94.9110	36.21	54.43	No	1.00
97.4085	35.54	54.22	No	1.00
145.4955	38.28	54.00	No	1.00
183.7590	34.11	54.00	No	1.00

D.3.2.2. Graphical representation of the test results



— Preview Result 2-AVG — Preview Result 1-PK+
— EN 55015 CDN QP ◇ Final_Result QPK

Ambient temperature: 20°C

D.4. Measurements of the harmonics of the input current in five equidistant steps between the minimum and the maximum power

Harmonic order	Meas. 1 Min (A)	Meas. 2 (A)	Meas. 3 (A)	Meas. 4 (A)	Meas. 5 Max (A)	Class C a) Limits (A)
1	0.0441	0.0706	0.1229	0.1804	0.2381	-.----
2	(*)	(*)	(*)	(*)	(*)	0.0048
3	0.0091	(*)	(*)	(*)	0.0102	0.0714
4	(*)	(*)	(*)	(*)	(*)	-.----
5	0.0062	0.0050	(*)	(*)	(*)	0.0238
6	(*)	(*)	(*)	(*)	(*)	-.----
7	(*)	(*)	0.0071	0.0079	0.0080	0.0167
8	(*)	(*)	(*)	(*)	(*)	-.----
9	(*)	(*)	0.0065	0.0083	0.0092	0.0119
10	(*)	(*)	(*)	(*)	(*)	-.----
11	(*)	(*)	(*)	0.0054	0.0065	0.0071
> 11	(*)	(*)	(*)	(*)	(*)	≤ 0.0071

(*) Harmonic currents less than 0,6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.
(IEC / EN 61000-3-2: § 6.2.3.4)

Ambient temperature: 22°C

Measurement uncertainties:

The measurement uncertainties can be obtained on request.

D.5. Immunity according to IEC 61547 / EN 61547

Unless otherwise specified the test voltage is 230 V - 50 Hz.
The normal behaviour of the appliance has been monitored by checking the luminous intensity and the current consumption.

As requested by the standard, the light output level has been set at 50 % \pm 10 %

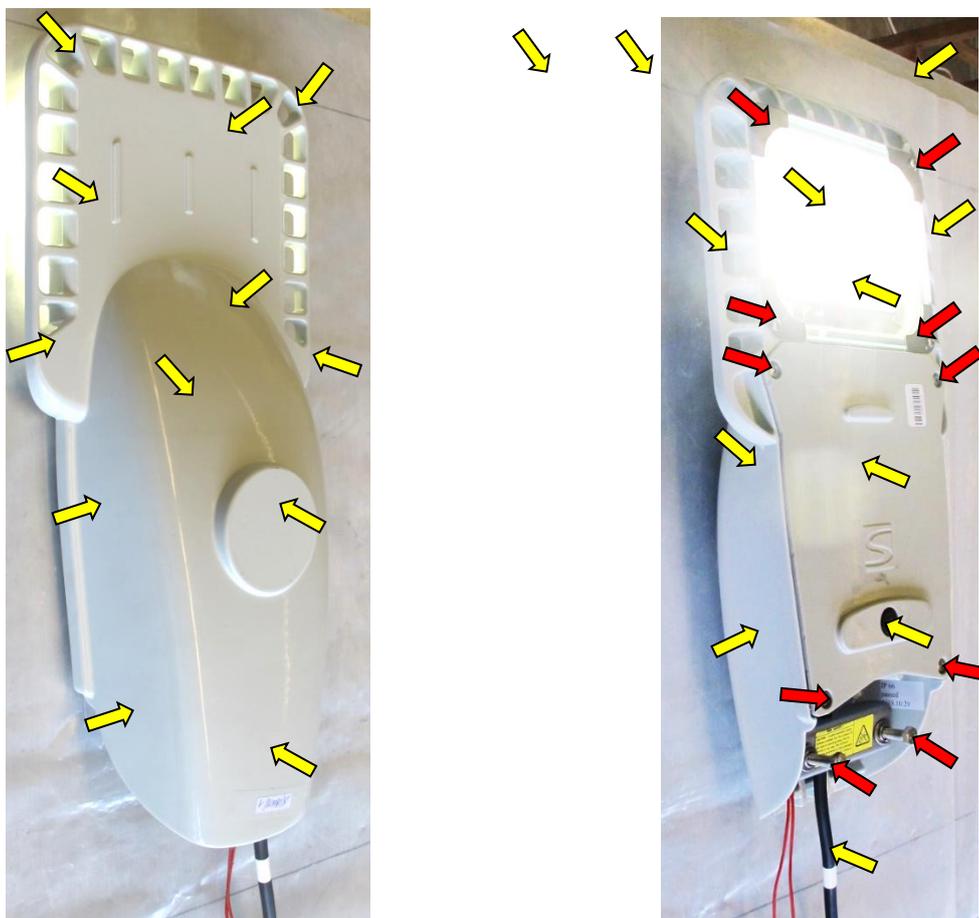
D.5.1. Electrostatic discharge (IEC / EN 61000-4-2)

Twenty 4 kV contact discharges (ten positive and ten negative polarity) have been applied on the metal parts of the appliance and on the coupling planes.
Twenty 8 kV air discharges (ten positive and ten negative polarity) have been applied on the accessible insulated parts.

No noticeable degradation has been recorded.

Ambient temperature: 21°C
Relative humidity: 38 %

Yellow arrow: air discharges
Red arrow: contact discharges



D.5.2. Radiated, radio frequency electromagnetic field (EN 61000-4-3)

The EUT has been placed in the full anechoic room on a wooden table, 0,8 m high above the floor.

The cable of the power supply connected to the EUT is falling on the floor.

The front side (luminous side) of the EUT has been illuminated in vertical and in horizontal polarisation with an electromagnetic field.

Frequencies:	80 MHz to 1000 MHz
Electromagnetic field level:	3 V/m
Amplitude modulation:	80%AM 1kHz
Frequency step:	1%
Dwell time:	1 s

No noticeable degradation has been recorded.

D.5.3. Fast transients (IEC / EN 61000-4-4)

During four minutes (two minutes positive and two minutes negative polarity) fast transients 1 kV 5/50 ns, 5 kHz rep. freq., have been applied on the mains supply in common mode.

Ambient temperature:	20°C
Relative humidity:	40 %

No noticeable degradation has been recorded.

D.5.4. Surges (IEC / EN 61000-4-5)

Ten surge pulses 0,5 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 0,5 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 0,5 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 2 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 2 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

At the request of the customer:

Ten surge pulses 2 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 4 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

Blinking of the light has been observed when the pulses (positive and negative) were applied.

Ten surge pulses 4 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 4 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 8 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

Blinking of the light has been observed when the pulses (positive and negative) were applied.

Ten surge pulses 8 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

Blinking of the light has been observed when the pulses (positive and negative) were applied.

Ten surge pulses 8 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 10 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

Blinking of the light has been observed when the pulses (positive and negative) were applied.

Ten surge pulses 10 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

Blinking of the light has been observed when the pulses (positive and negative) were applied.

Ten surge pulses 10 kV 1,2/50 μ s (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ambient temperature: 20°C

Relative humidity: 39 %

D.5.5. Injected currents (IEC / EN 61000-4-6)

R.F. current from 0,15 MHz to 80 MHz, 80% AM 1 kHz modulation, 3 V_{RMS} amplitude, has been applied, through a coupling/decoupling network CDN-M3, on the mains supply in common mode.

Frequency step: 1 %

Dwell time: 1 s

No noticeable degradation has been recorded.

D.5.6. Voltage dips (IEC / EN 61000-4-11)

The test voltage is 230V - 50Hz.

A voltage dip of 30 % U_T (161 V) during 200 ms has been applied on the mains supply.

No noticeable degradation has been recorded.

D.5.7. Interruptions (IEC / EN 61000-4-11)

Interruptions of supply during 10 ms have been applied on the mains supply.

During the interruptions, a blinking of the light has been recorded.

E. Conclusions

For the tested appliance (see section A – Specifications of the EUT) the following results are obtained :

E.1. Emission measurements:

Measurement uncertainties

The measurement uncertainties can be obtained on request.

CISPR 15 / EN 55015 - see test results in parts D.1., D.2. & D.3. Complies

- Terminal disturbance voltages Complies
- Radiated emissions Complies
- Conducted RF emissions Complies

IEC / EN 61000-3-2 Complies

The appliance complies with EN 61000-3-2 on the basis of the measurements in D.4.

IEC / EN 61000-3-3 Complies

The appliance complies with the requirements of IEC / EN 61000-3-3 as it does not produce voltage fluctuations by its principle of operation.

E.2. Immunity tests results:

IEC 61547 / EN 61547 - see test results in parts D.5.

Complies

Performance criteria following IEC 61547 / EN 61547

Performance criterion A:

During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B:

During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall restore to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C:

During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the power supply and/or operating the regulating control.

Additional requirement for lighting equipment incorporating a starting device:

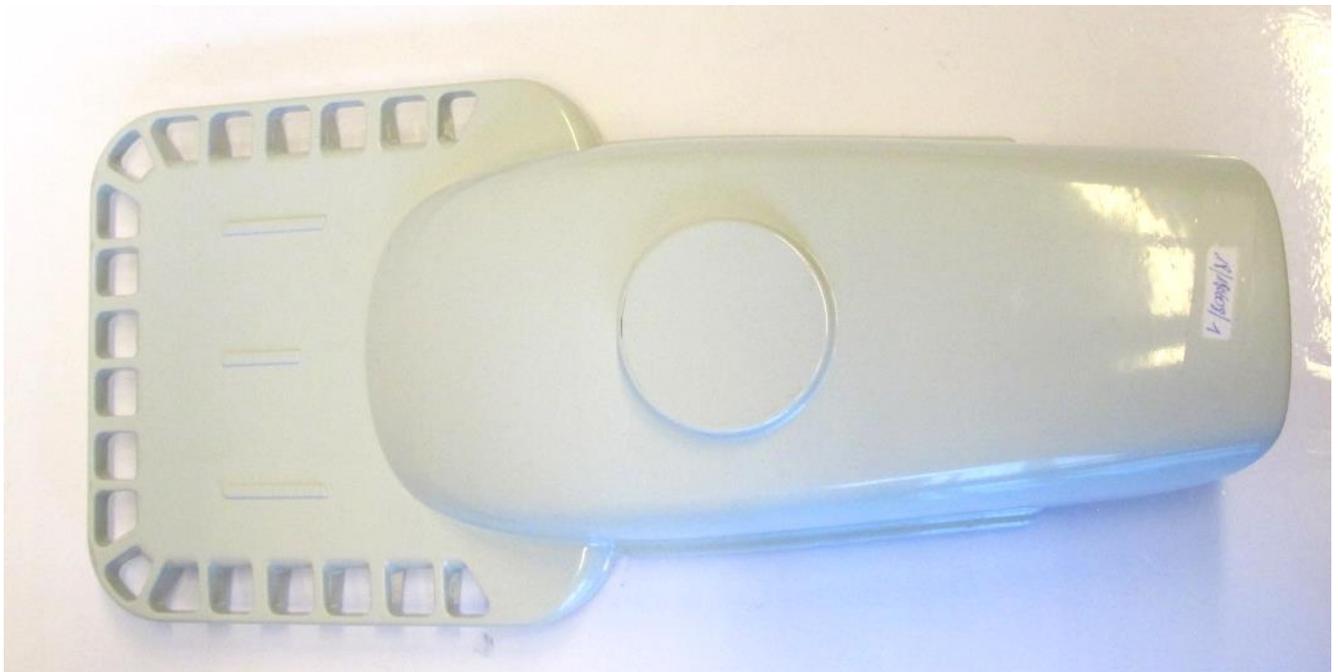
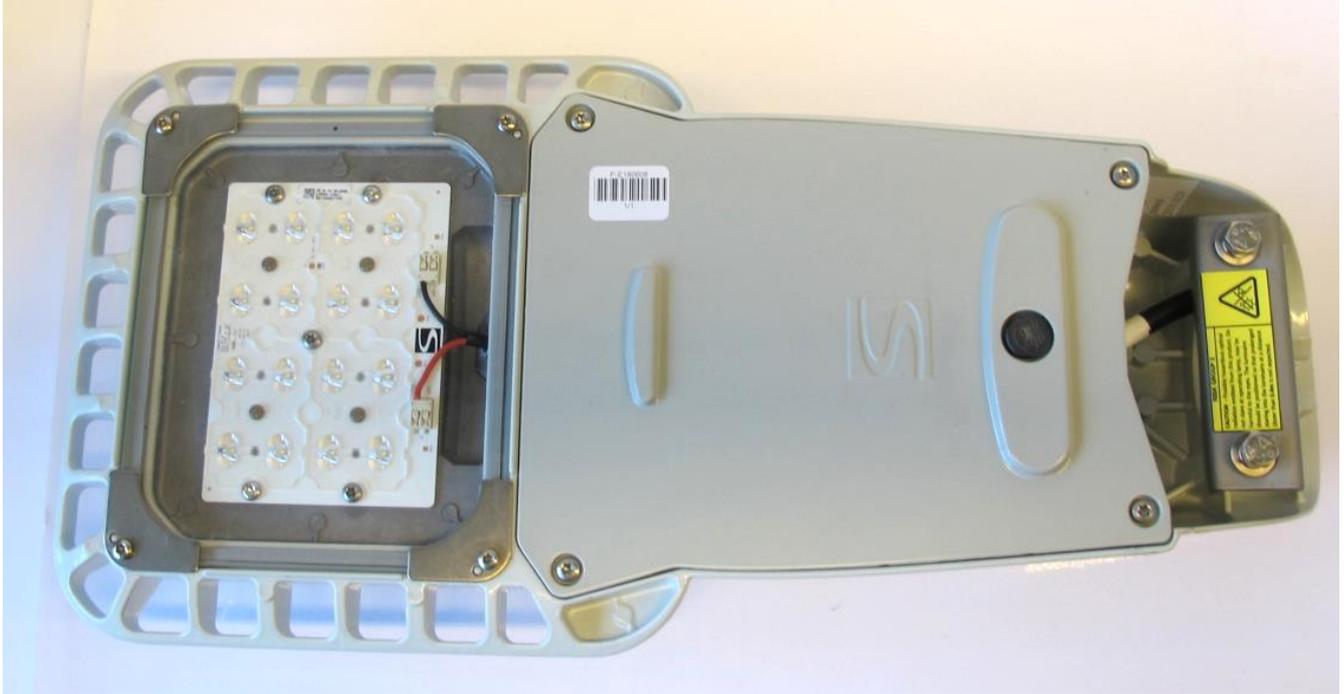
After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

Tests	Standards	Requested performance criteria	Obtained criteria
Electrostatic discharges	IEC / EN 61000-4-2	B	A
Radiated, RF electromagnetic field	IEC / EN 61000-4-3	A	A
Fast transients	IEC / EN 61000-4-4	B	A
Surges	IEC / EN 61000-4-5	C	A *
Injected currents	IEC / EN 61000-4-6	A	A
Voltage dips	IEC / EN 61000-4-11	C	A
Voltage Interruptions	IEC / EN 61000-4-11	B	B

*: for the surges with the special requirements of the customers, a B criteria has been obtained.

APPENDIX 1

Pictures of the EUT



Open view of the EUT

