

Environmental and material tests (ENV) SECTOR

Product description:	Led lights
Tested Models:	Sample 01 -> Led Puma -> 28234/LED/AS Sample 02 -> Extreme Led -> 556600_04 Sample 03 -> Led Monza Round -> 27337/R Sample 04 -> Led Rondò -> 32541
Manufacturer:	L.C. RELCO S.p.A. Via delle Azalee, 6/A, 20090 Buccinasco MI - Italy

Test specification:	EN 60598-1:2015
Application:	On customer request only the following tests: <ul style="list-style-type: none">- Verification of degree of protection IP66 (Sample 01, 02)- Verification of degree of protection IP67 (Sample 03, 04)
Remarks:	None

Customer:	L.C. RELCO S.p.A. Via delle Azalee, 6/A, 20090 Buccinasco MI - Italy		
Purchase Order:	1800480	dated:	2018-03-15
Order Confirmation:	CO 2018-0099-00	dated:	2018-03-15

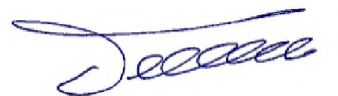
Samples receiving date:	2018-03-16		
Tests date:	from:	2018-03-19	to: 2018-03-23

Test Laboratory INTEK S.p.A. - Test and Measurement Division Via Mazzini, 75 - 25086 Rezzato (BS) - Italy Tel. +39 030 2591857 Fax +39 030 2594351 url: http://www.intek.it e-mail: info@intek.it	Test site INTEK S.p.A. - Test and Measurement Division Via Breve - 25086 Rezzato (BS) - Italy
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Verified by
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Enrico Veronesi
General Manager



This document does not include any attachments.

00	2018-03-30	Formal issue
Rev.	Date	Description

Results of tests and controls reported in this document refer only to samples as tested and described.

It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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1. PURPOSE

Purpose of this document is to contain results of the tests, measurements and verifications performed to assess the compliance of the samples under test, as identified and described in paragraph 3, to requirements of the standards listed in paragraph 2.

2. APPLICABLE DOCUMENTS

The tests are performed in compliance with the standards listed below:

Document	Title
EN 60598-1:2015	Luminaires Part 1: General requirements and tests

Afterwards, the “applicable documents”, will be indicated without date and/or edition number and/or amendments.

2.1 OTHER DOCUMENTS

Document	Date	Rev.	Title
INTEK 05 04 PP 041 PRE	2017-05-30	08	Intek procedure for IP (first characteristic)
INTEK 05 04 PP 043 PRE	2016-05-25	03	Intek procedure for IP (second characteristic)
INTEK 05 04 PP 038 PRE	2017-06-19	08	Intek procedure for dielectric test

3. SAMPLE INFORMATION

Unless otherwise specified, the technical data stated in this paragraph are declared by the customer/manufacturer or obtained from the product technical documentation.

3.1 DESCRIPTION

Identification data of samples under test are reported in the first page of this document.



Photo of the sample 01 (external view 1)



Photo of the sample 01 (external view 2)



Marking plate / markings sample 01



Photo of the sample 02 (external view 1)

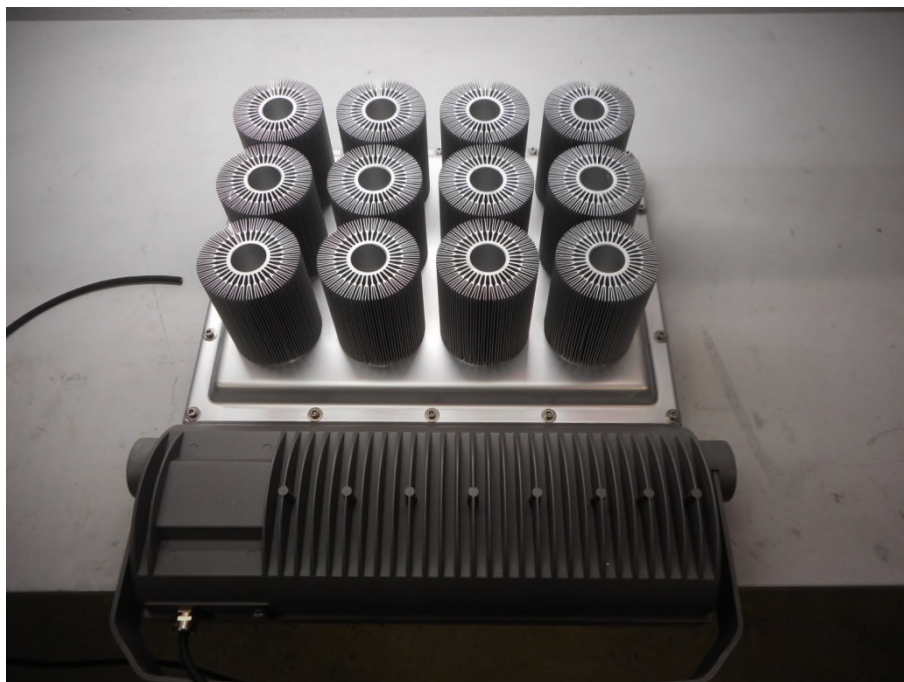


Photo of the sample 02 (external view 2)



Marking plate / markings sample 02



Photo of the sample 03 (external view 1)



Photo of the sample 03 (external view 2)



Marking plate / markings sample 03



Photo of the sample 04 (external view 1)



Photo of the sample 04 (external view 2)



Marking plate / markings sample 04

3.1.1 TECHNICAL DATA

Power supply nominal voltage:	230 Vac
Rated frequency:	50 Hz
Rated power:	Sample 01 -> 120W Sample 02 -> 575W Sample 03 -> 54W Sample 04 -> 40W
Dimensions:	Sample 01 -> 450 x 320 x 125 mm Sample 02 -> 572 x 530 x 180 mm Sample 03 -> 1320 x 60 mm Sample 04 -> 285 x 228 mm

3.1.2 CLASSIFICATION

Sample N°:	Degree of enclosure protection:	Other:
01	IP66	Insulating Class II
02	IP66	Insulating Class I
03	IP67	Insulating Class II
04	IP67	Insulating Class I

3.1.3 ADDITIONAL INFORMATION

None

3.2 SAMPLES ORIGIN

The samples under test are supplied by the Manufacturer.

The information relating to the initial sampling are not known.

Received samples:	04 (01 for each model)
Tested samples:	04 (01 for each model)
Selection method of the laboratory:	<input type="checkbox"/> Random taking <input checked="" type="checkbox"/> N/A

4. TEST INFORMATION

4.1 CONDITIONS DURING THE TESTS

4.1.1 PERSONNEL

Tests performed by: ***Cristiano Bellanca (Intek S.p.A) for all the tests***
Marco Camodeca (Intek S.p.A) for all the tests

Test supervised by: ***Flavio Floriani (Intek S.p.A.) for all the tests***

4.1.2 MODIFICATIONS TO SAMPLES

Test samples were not modified during the tests.

4.1.3 ENVIRONMENTAL CONDITIONS

The laboratory environmental conditions are recorded during the tests and for each test, the ranges that the laboratory ensures are listed in the relative paragraph. These ranges are in conformity to the limits prescribed by the reference standards.

4.1.4 CONVENTIONS

If applicable, on the right of each chapter or paragraph is written the number of the chapter or paragraph of reference Standard in the form: § number.

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

4.1.5 ABBREVIATIONS

N/A = Not Applicable

N/Av = Not Available

N/D = Not Declared

N/R = Not Required (by the applicant, customer or manufacturer)

No. = Number

F = Fail

P = Pass

TR = Test Report

EUT = Equipment Under Test

NCR = No Calibration Required

x ... y = from x to y

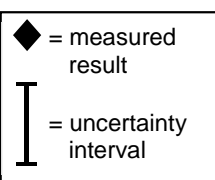
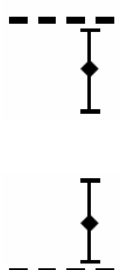



4.2 CONFIGURATION

The test samples are individually verified following the methods and the procedures specified in the reference documents.

4.3 CRITERIA ADOPTED FOR COMPLIANCE EVALUATION

If applicable for compliance evaluation of the test results and considering the uncertainty values of the tests, the Laboratory adopts the following criteria:

- the reference standard specifies uncertainty for measurements:
 - measurements uncertainty permitted, or
 - instruments accuracy, or
 - application of measurements uncertainty to the measured values,
 in this case the measurement complies with the requirement if the measured value is within the limits, or with the correction due to the Laboratory uncertainty.
- the reference standard doesn't specify uncertainty for measurements or particular requirements of the instrumentation: in this case the Laboratory uses the following scheme:

	Case A	Case B	Case C	Case D
Specified upper limit  Specified lower limit				
	Pass	Pass	Fail	Fail

For Case B the result is considered to comply with the requirements only if the value is within the limits of the standard.

5. TEST RESULTS

Par. TR	Test / Requirement	Specification	Result
6.1	Verification of degree of protection IP6X	EN 60598-1 par. 9.2.2	Pass
6.2	Verification of degree of protection IPX6	EN 60598-1 par. 9.2.7	Pass
6.3	Verification of degree of protection IPX7	EN 60598-1 par. 9.2.8	Pass

Notes: /

5.1 SAMPLES CORRELATION / TEST SEQUENCE

The samples are sequentially subjected to the tests described in the following table.

Test	Sample No.	Remarks
Verification of degree of protection IP6X	1, 2, 3, 4	None
Verification of degree of protection IPX6	1, 2	None
Verification of degree of protection IPX7	3, 4	None

5.2 TEST METHOD DEVIATIONS

Test methods described in the reference document are adopted without any deviation.

6. TESTS PERFORMED

6.1 VERIFICATION OF DEGREE OF PROTECTION IP6X

The test is performed according to requirements of standards listed on chapter 2.	
Test method:	EN 60598-1 par. 9.2.2
Test procedure:	INTEK 05 04 PP 041 PRE

6.1.1 TEST PARAMETERS

Sample No.	Power supply	Temperature measured on the protective screen of the lamp after 3 hour of operation	Position for temperature measurement	Luminaire supplied inside the dust chamber	Duration of the test
01	230 Vac	62,4 °C – 3 h	On external glass	1 minute	3 h
02	230 Vac	55,0 °C – 3 h	On external glass	1 minute	3 h
03	230 Vac	42,0 °C – 3 h	On external glass	1 minute	3 h
04	230 Vac	56,4° C – 3 h	On external glass	1 minute	3 h

Acceptance criteria:

At the end of test no deposit of talcum powder inside enclosures for dust-tight luminaires.

The equipment shall withstand to the dielectric test after the test for degree IPX6 / IPX7.

6.1.2 ENVIRONMENTAL CONDITIONS OF THE TEST SITE

Temperature:	(23,0 ± 5) °C
Relative humidity:	(50 ± 25) %
Atmospheric press.:	(960 ± 100) mbar

6.1.3 SUMMARY OF RESULTS

Sample No.	Description	Result
01	At the end of the test no deposit of talcum powder was visible inside the enclosure.	Pass (#1)
02	At the end of the test no deposit of talcum powder was visible inside the enclosure.	Pass (#1)
03	At the end of the test no deposit of talcum powder was visible inside the enclosure.	Pass (#1)
04	At the end of the test no deposit of talcum powder was visible inside the enclosure.	Pass (#1)

Notes: **(#1)** - The sample was opened and inspected after the test for degree IPX6 / IPX7.
The dielectric test on the samples were performed after IPX6 and IPX7 tests.

6.1.4 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Thermometer	Fluke	52	0326 P	2017-03	2018-03
Dust chamber	ATS di Galbusera	03.01	0049 F	NCR	NCR
Talcum	/	/	0945 U	NCR	NCR
Test sieve for dust chamber	Endecotts	75 Mic.	0835 P	2017-11	2018-05
Chronometer	RS	278698	0853 P	2017-03	2018-03
Thermo/hygrometer	Deltaohm	HD35EDL1NT VI	1048 P	2017-03	2018-03
Barometer	Fischer	/	0224 P	2015-01	2019-01

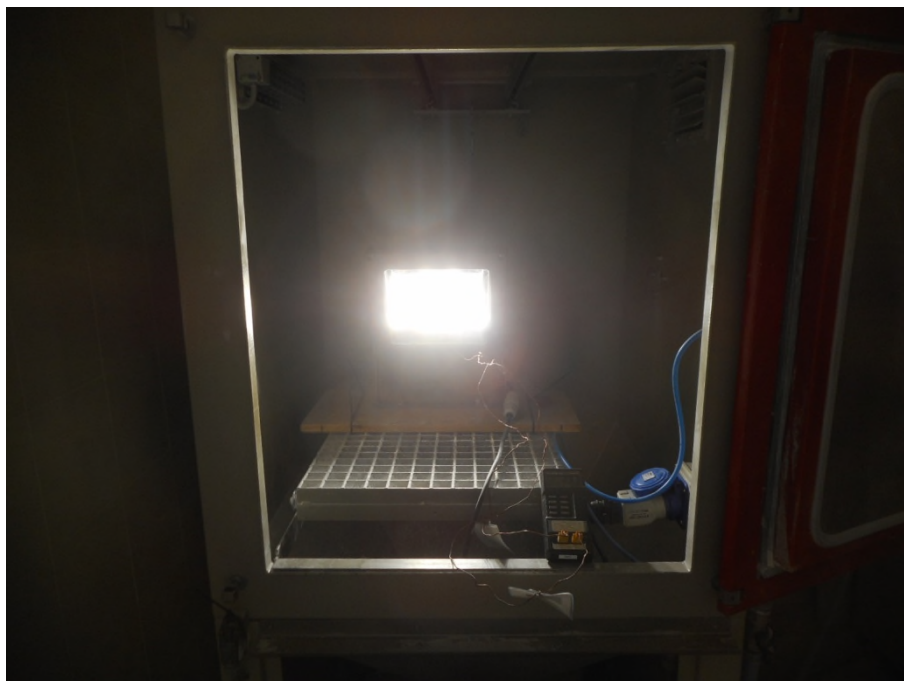
6.1.5 MEASUREMENT UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$):

Measure	Uncertainty U
Temperature	2,0 °C
Time	1,0 %

6.1.6 GRAPHS AND PHOTOGRAPHS

1 - Photo of test set-up – Sample 01



2 - Photo of test set-up – Sample 01



3 - Photo of test set-up – Sample 01



4 - Photo of test set-up – Sample 02



5 - Photo of test set-up – Sample 02



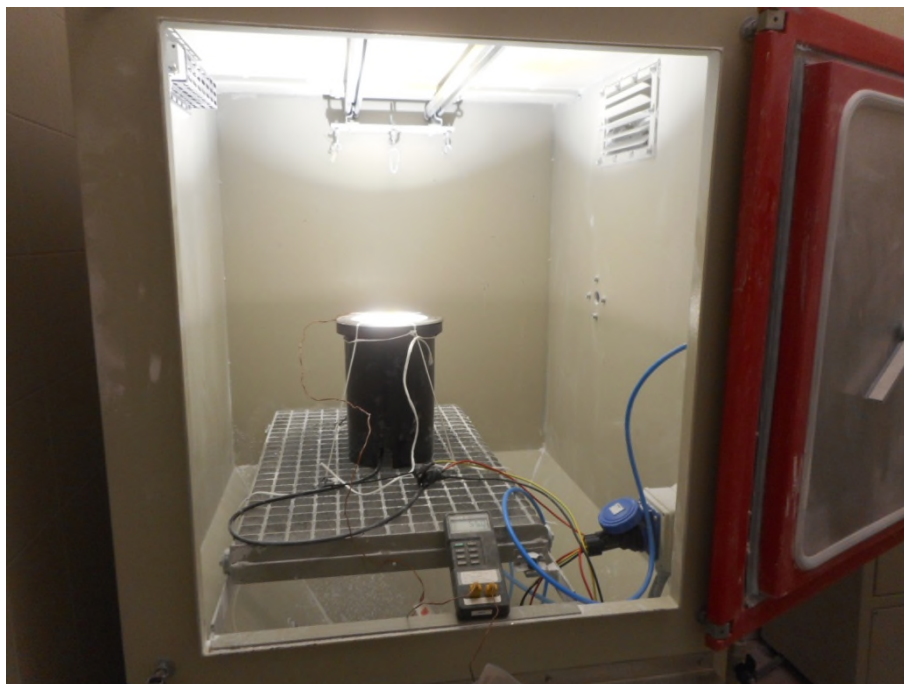
6 - Photo of test set-up – Sample 02



7 - Photo of test set-up – Sample 03



8 - Photo of test set-up – Sample 03



9 - Photo of test set-up – Sample 04



10 - Photo of test set-up – Sample 04

6.2 VERIFICATION OF DEGREE OF PROTECTION IPX6

The test is performed according to requirements of standards listed on chapter 2.

Test method:	EN 60598-1 par. 9.2.7
Test procedure:	INTEK 05 04 PP 043 PRE

6.2.1 TEST PARAMETERS

Sample No.	Power supply	Temperature measured on the protective screen of the lamp after 15 hour of operation	Position for temperature measurement	Distance from nozzle to the sample	Delivery rate	Duration of the test
01	230 Vac	62,5 °C – 15 h	On external glass	3 m	100 l/min	3 minute
02	230 Vac	55,0 °C – 15 h	On external glass	3 m	100 l/min	3 minute

Acceptance criteria:

At the end of test no deposit of water inside enclosures.

Dielectric test:

Sample No.	Insulating Class	Required voltage Value [Vac] – Tab.10.2 EN 60598-1	Required test duration [s]	Applied voltage Value [Vac]	Test duration [s]	Application point
01	II	3000 V	60	3000	60	Power supply → enclosure (the leds were re) Class III
02	I	1500 V	60	1500	60	Power supply → enclosure

Acceptance criteria:

The equipment shall withstand to the dielectric test.

6.2.2 ENVIRONMENTAL CONDITIONS OF THE TEST SITE

Temperature:	(23,0 ± 5) °C
Relative humidity:	(50 ± 25) %
Atmospheric press.:	(960 ± 100) mbar

6.2.3 SUMMARY OF RESULTS

Sample No.	Description	Result
01	At the end of the test no traces of water were visible inside the enclosure. No flashover nor breakdown occurred during testing.	Pass
02	At the end of the test no traces of water were visible inside the enclosure. No flashover nor breakdown occurred during testing.	Pass

Notes: /

6.2.4 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Thermometer	Fluke	52	0326 P	2017-03	2018-03
Water jet hose nozzle Ø 12,5mm	ATS di Galbusera	03.23	0027 P	2016-05	2018-05
Water flowmeter 130 l/min	CVC	D7	0025 P	2017-11	2019-05
Measuring tape	BMI Radius	20 m	0695 P	2018-01	2022-01
Chronometer	RS	278698	0853 P	2018-03	2019-03
AC Dielectric strength tester	ETL Pruftechnik	UX36TPT5AC-200	0899 P	2018-01	2019-01
Thermo/hygrometer	Deltaohm	HD35EDL1NT VI	1047 P	2017-03	2018-08
Barometer	Fischer	/	0224 P	2015-01	2019-01

6.2.5 MEASUREMENT UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$):

Measure	Uncertainty U
IPX6 test	
Water flow	5,0 %
Linear dimension > 25 mm	0,5 %
Time	1,0 %
Temperature	2,0 °C
Dielectric test	
Voltage (RMS)	3,0 %
Time	1,0 %
Current	1,5 %

6.2.6 GRAPHS AND PHOTOGRAPHS

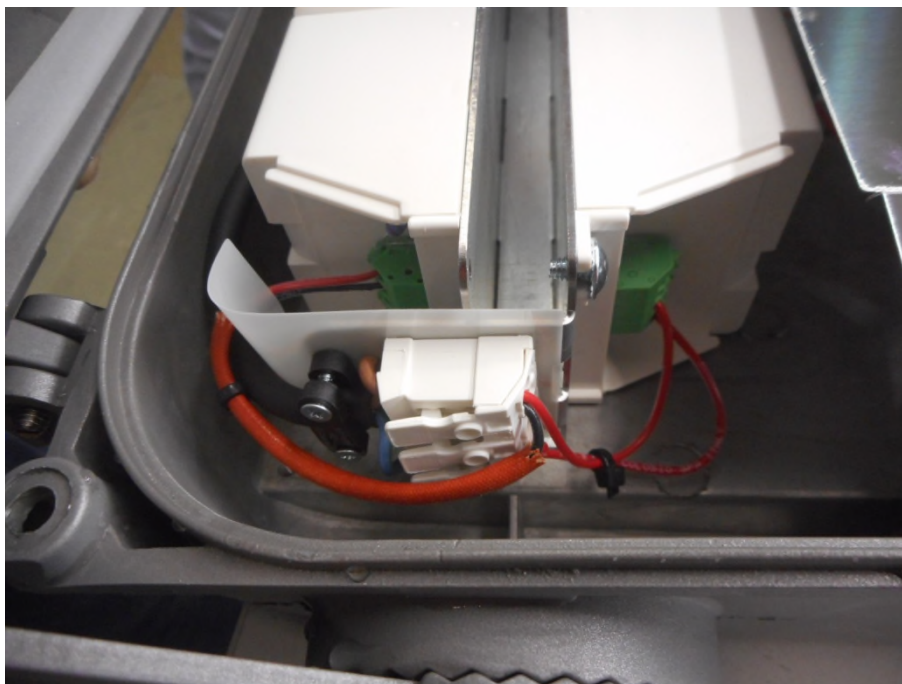
11 - Photo of test set-up – Sample 01



12 - Photo of test set-up – Sample 01



13 - Photo of test result – Sample 01



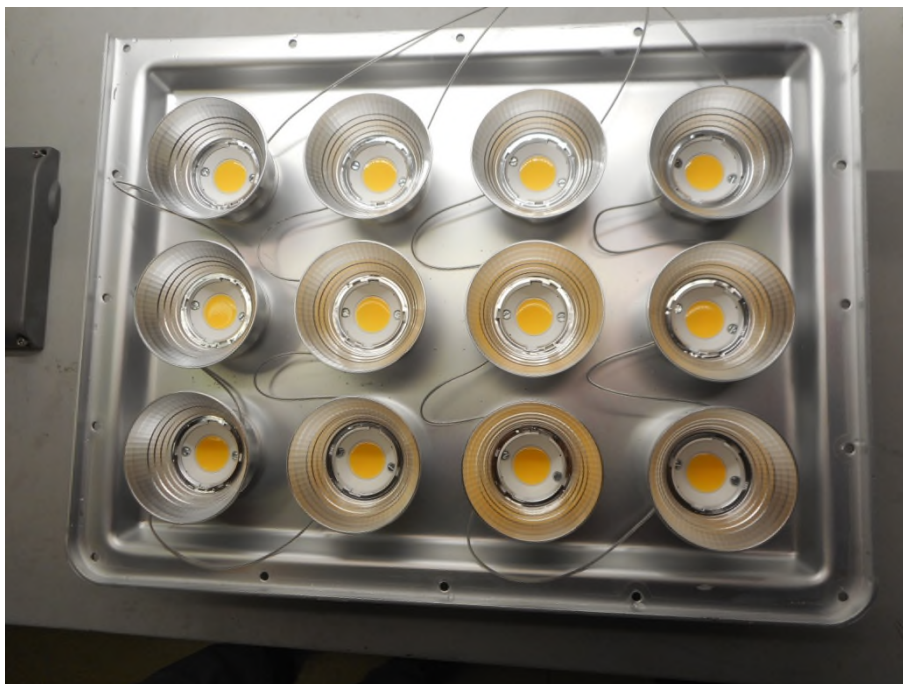
14 - Photo of test result – Sample 01



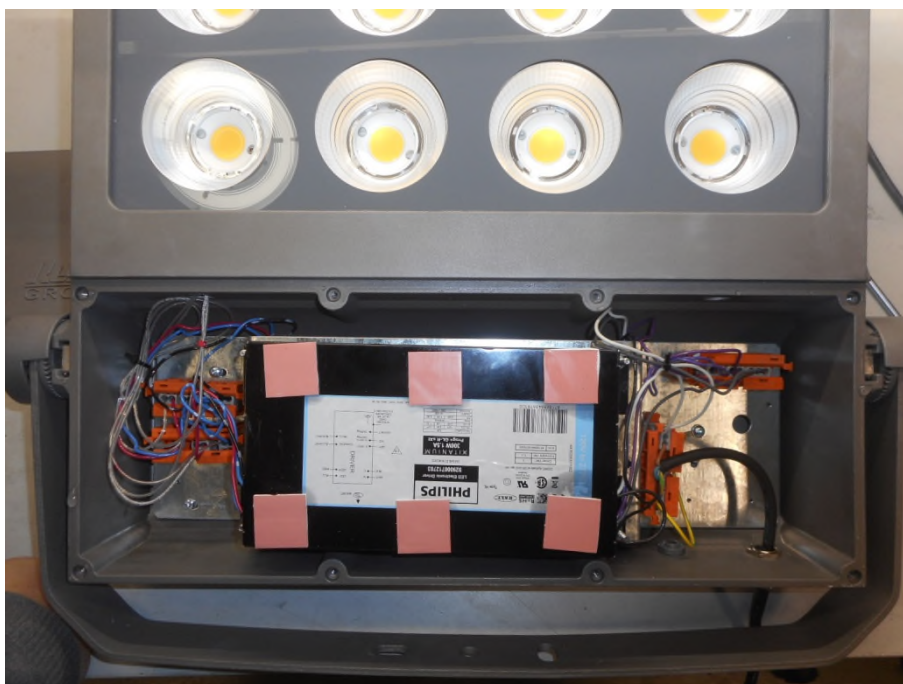
15 - Photo of test set-up – Sample 02



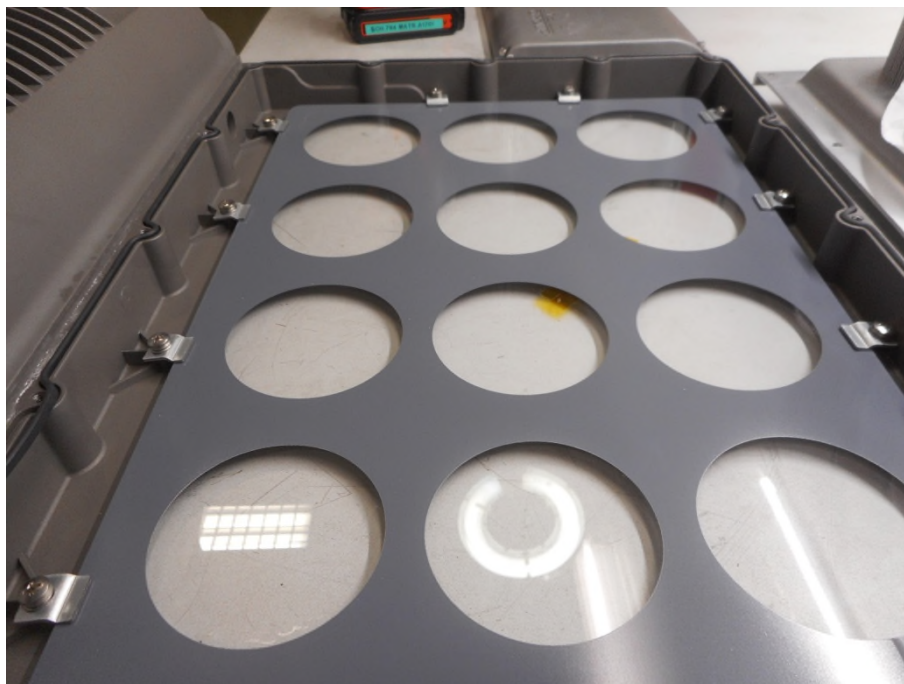
16 - Photo of test set-up – Sample 02



17 - Photo of test result – Sample 02



18 - Photo of test result – Sample 02



19 - Photo of test result – Sample 02

6.3 VERIFICATION OF DEGREE OF PROTECTION IPX7

The test is performed according to requirements of standards listed on chapter 2.

Test method:	EN 60598-1 par. 9.2.8
Test procedure:	INTEK 05 04 PP 043 PRE

6.3.1 TEST PARAMETERS

Sample No.	Power supply	Temperature measured on the protective screen of the lamp after 15 hour of operation	Position for temperature measurement	Lowest point at	Duration of the test
03	230 Vac	42,0 °C – 15 h	On external glass	1450 mm	30 minute
04	230 Vac	56,5 °C – 15 h	On external glass	1000 mm	30 minute

Acceptance criteria:

At the end of test no deposit of water inside enclosures.

The equipment shall withstand to the dielectric test.

Dielectric test:

Sample No.	Insulating Class	Required voltage Value [Vac] – Tab.10.2 EN 60598-1	Required test duration [s]	Applied voltage Value [Vac]	Test duration [s]	Application point
03	II	3000 V	60	3000	60	Power supply → enclosure
04	I	1500 V	60	1500	60	Power supply → enclosure

6.3.2 ENVIRONMENTAL CONDITIONS OF THE TEST SITE

Temperature:	(23,0 ± 5) °C
Relative humidity:	(50 ± 25) %
Atmospheric press.:	(960 ± 100) mbar

6.3.3 SUMMARY OF RESULTS

Sample No.	Description	Result
03	At the end of the test no traces of water were visible inside the enclosure. No flashover nor breakdown occurred during testing.	Pass
04	At the end of the test no traces of water were visible inside the enclosure. No flashover nor breakdown occurred during testing.	Pass

Notes: /

6.3.4 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Thermometer	Fluke	52	0326 P	2017-03	2018-03
Diving tank	Intek	Intek	0087 N	NCR	NCR
Measuring tape	BMI Radius	20 m	0695 P	2018-01	2022-01
Chronometer	RS	278698	0853 P	2018-03	2019-03
AC Dielectric strength tester	ETL Pruftechnik	UX36TPT5AC-200	0899 P	2018-01	2019-01
Thermo/hygrometer	Deltaohm	HD35EDL1NT VI	1047 P	2017-03	2018-08
Barometer	Fischer	/	0224 P	2015-01	2019-01

6.3.5 MEASUREMENT UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$):

Measure	Uncertainty U
IPX7 test	
Linear dimension > 25 mm	0,5 %
Time	1,0 %
Temperature	2,0 °C
Dielectric test	
Voltage (RMS)	3,0 %
Time	1,0 %
Current	1,5 %

6.3.6 GRAPHS AND PHOTOGRAPHS

20 - Photo of test set-up – Sample 03



21 - Photo of test set-up – Sample 03



22 - Photo of test set-up – Sample 03



23 - Photo of test result – Sample 03



24 - Photo of test result – Sample 03



25 - Photo of test result – Sample 03



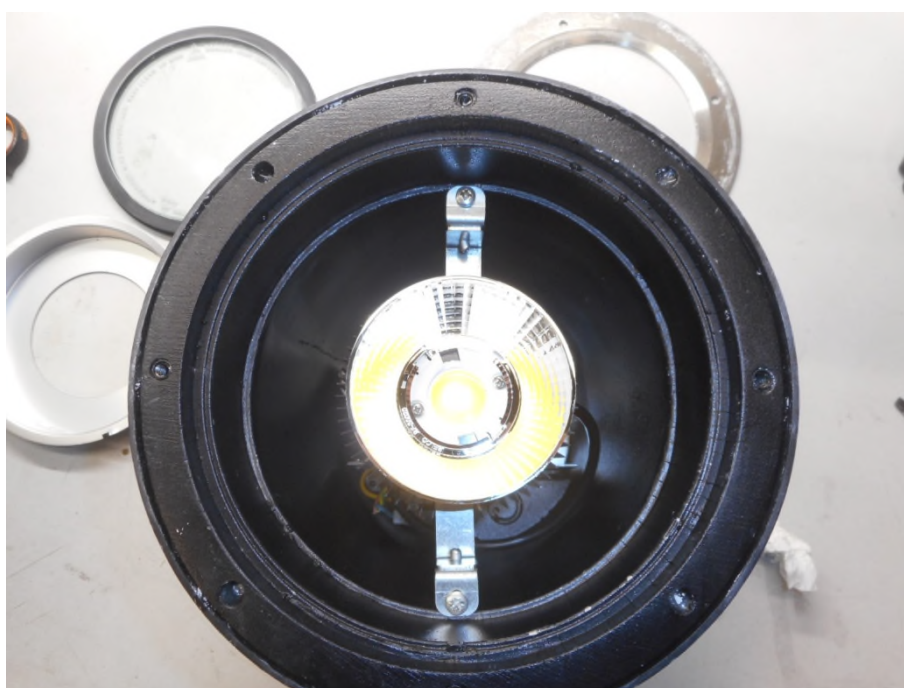
26 - Photo of test set-up – Sample 04



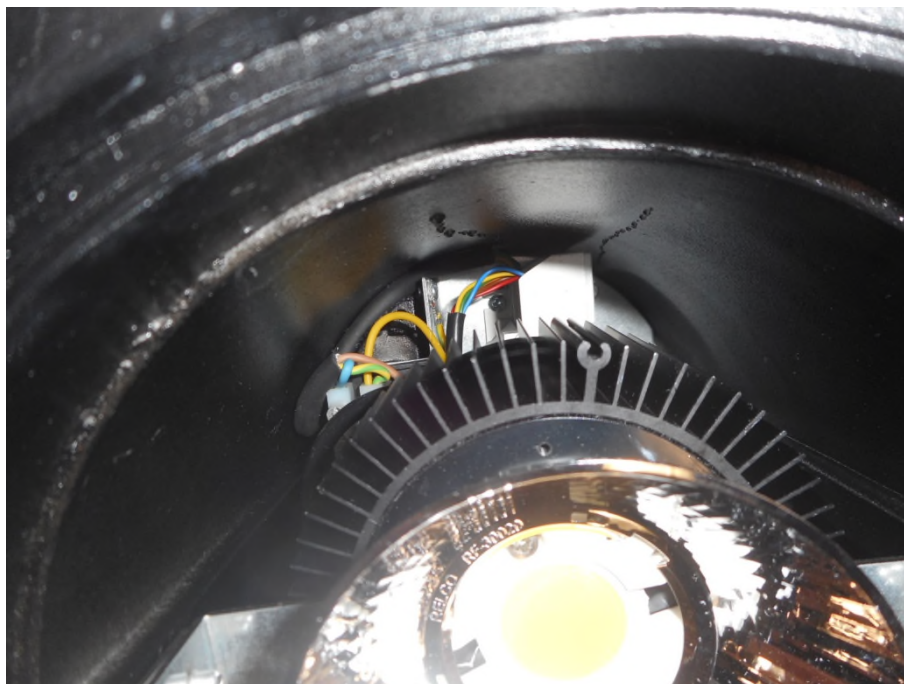
27 - Photo of test set-up – Sample 04



28 - Photo of test set-up – Sample 04



29 - Photo of test result – Sample 04



30 - Photo of test result – Sample 04

7. TEST INSTRUMENTATION

Common instruments not listed in the relative paragraph of the tests:

None.

7.1 INSTRUMENTATION ACCURACY

If reference standard doesn't specify otherwise, accuracy of used instruments is in accordance with the limits listed in the IEC operational document - IEC EE OD-5014 ed. 1.0 "Instrument Accuracy Limit".

8. ANNEXES LIST

None.

End of test report.