

TEST REPORT

- ☒ Conformity inspection acc.to Low Voltage Directive **2014/35/UE**
- ☒ Marking durability
- ☒ Construction durability
- ☒ Mechanical strenght test (IK)
- ☒ Provision for Earthing (PE)
- ☒ Protection against electric shock
- ☒ Resistance to dust, solid objects and moisture tests (IP)
- ☒ Insulation electric strength and insulation resistance
- ☒ Insulation spacings
- ☒ Thermal tests
- ☐ Resistance to fire (GWT)
- ☒ Power and the electrical parameters measurements
- ☒ Photobiological hazards



LUG Light Factory Ltd ul. Gorzowska 11 65-127 Zielona Góra, POLAND KRS 0000290498 REGON 080212116 NIP PL 929-17-85-452		LUG Testing Laboratory address: ul. Nowa 7 66-002 Nowy Kisielin, POLAND		TEST SPECIFICATION – STANDARDS: PN – EN 60598-1:2015 PN – EN 60598-2-3: 2006/A1:2012	
Test Report No.: BT_13_008_20 Complemented for Test Report No.: BT_13_007_15 BT_13_017_18		Tested by: Robert Tracz			
Sample No.: 116/1/18		Compiled by: Robert Tracz			
Applicant name: J.Kostrzewa R&D LUG LIGHT FACTORY		Approved by: Robert Tracz			
Tested from: 28.01.2020		Product type:		LUMINAIRE	
Through: 04.02.2020		Model name:		URBINO LED	
		Index:		130222.5L102.371	
		Power [W]:		106W	
		IP Degree:		66	
		Ratings:		220-240V /50/60Hz	
		Type of protection:		CL I CL II	
		Group:		STREET LIGHTING - OUTSIDE	
This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.					

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 2 / 43
-----------------	----------------	--------------------------	---------------

1. TABLE OF CONTENTS

1.	TABLE OF CONTENTS.....	2
2.	COMPONENT LIST.....	2
3.	COPY OF MARKING PLATE.....	2
4.	POSSIBLE TEST CASE VERDITS:.....	2
5.	TEST RESULTS ARE ALSO VALID FOR.....	3
6.	TEST PROGRAM.....	4
	ANNEX 1: SCREW TERMINALS (PART OF THE LUMINAIRE).....	19
	ANNEX 2: SCREWLESS TERMINALS (PART OF THE LUMINAIRE).....	20
	ANNEX 3: TABLE: TEMPERATURE MEASUREMENTS, THERMAL TEST OF SECTION 12.....	21
	ANNEX 4: IK TESTS.....	31
	ANNEX 5: LIST OF MEASURING APPARATUS USED IN TESTS.....	32
	ANNEX 6: DETAILS IMAGES (PHOTOS).....	33

2. COMPONENT LIST

No.	Component	Producer/Model/Type	Parameters	Standard/Mark
1.	LED DRIVER	PHILIPS XITANIUM Lite Prog 40W 0.3-1.0A sXt	Ta=-40÷55°C; Tc=85°C	ENEC05
2.	LED DRIVER	OSRAM OPTOTRONIC OT 50/120-277/700 P5	Ta=55°C; Tc=80°C	CE
3.	LED DRIVER	OSRAM OPTOTRONIC OT 100/120-277/800 2 DIMLT2 P	Ta=55°C; Tc=85°C	ENEC15
4.	LED DRIVER	OSRAM OPTOTRONIC OT 100/120-277/700 P5	Ta=55°C; Tc=85°C	CE
5.	LED MODULE	LUG ML1500300.W740.02A	Tc=85°C	CE
6.	LED MODULE	LUG ML1500301.W740.05A	Tc=85°C	CE
7.	LED MODULE	LUG ML1500301.W740.04A	Tc=85°C	CE
8.	LED MODULE	LUG ML1401010.W740.03A	Tc=85°C	CE
9.	LED MODULE	LUG ML1500302.W740.03A	Tc=85°C	CE

3. COPY OF MARKING PLATE



4. POSSIBLE TEST CASE VERDITS:

Test case does not apply to the test object: N/A (Not Applicable)

Test object does meet the requirement: P (Pass)

Test object does not meet the requirement: F (Fail)

5. TEST RESULTS ARE ALSO VALID FOR

Code	Type of equipment	Luminaire power [W]	Lumen /luminaire [lm]	Efficacy [lm/W]	Colour temperature [K]	CRI/Ra	Operating temperature range [°C]
Type: O33, O34, O35, O36, O37P, O37L, O38, O39, O40 optics							
130222.5L79X.XX1	ED	23	3150	137	3000	>70	* max +50
130222.5L74X.XX1	ED	23	3400	148	4000	>70	* max +50
130222.5L80X.XX1	ED	35	4850	139	3000	>70	* max +50
130222.5L75X.XX1	ED	35	5200	149	4000	>70	* max +50
130222.5L81X.XX1	ED	51	7100	139	3000	>70	* max +50
130222.5L76X.XX1	ED	51	7650	150	4000	>70	* max +50
130222.5L82X.XX1	ED	68	9350	138	3000	>70	* max +50
130222.5L77X.XX1	ED	68	10050	148	4000	>70	* max +50
130222.5L83X.XX1	ED	102	13500	132	3000	>70	* max +50
130222.5L78X.XX1	ED	102	14500	142	4000	>70	* max +50
Type: O13, O14, O15, O16 optics							
130222.6L30X.XX1	DALIED	27	3350	124	3000	>70	* max +50
130222.6L84X.XX1	DALIED	27	3400	126	4000	>70	* max +50
130222.6L31X.XX1	DALIED	35	4500	129	3000	>70	* max +50
130222.6L85X.XX1	DALIED	35	4500	129	4000	>70	* max +50
130222.6L32X.XX1	DALIED	51	6600	129	3000	>70	* max +50
130222.6L86X.XX1	DALIED	51	6600	129	4000	>70	* max +50
130222.6L33X.XX1	DALIED	75	10050	132	3000	>70	* max +50
130222.6L87X.XX1	DALIED	75	10100	133	4000	>70	* max +50
130222.6L34X.XX1	DALIED	99	13050	132	3000	>70	* max +50
130222.6L88X.XX1	DALIED	99	13100	132	4000	>70	* max +50
130222.6L35X.XX1	DALIED	128	16150	126	3000	>70	* max +40
130222.6L89X.XX1	DALIED	128	16200	127	4000	>70	* max +40
130222.6L36X.XX1	DALIED	157	19050	121	3000	>70	* max +35
130222.6L90X.XX1	DALIED	157	19050	121	4000	>70	* max +35
Type: O2, O3, O4, O5, O6P, O6L, O7, O8, O26, O59, O60, O61 optics							
130222.5L42X.XX1	ED	29	3000	103	3000	>70	* max +50
130222.5L01X.XX1	ED	29	3150	109	4000	>70	* max +50
130222.5L43X.XX1	ED	37	3950	107	3000	>70	* max +50
130222.5L13X.XX1	ED	37	4100	111	4000	>70	* max +50
130222.5L44X.XX1	ED	55	5900	107	3000	>70	* max +50
130222.5L04X.XX1	ED	55	6100	111	4000	>70	* max +50
130222.5L45X.XX1	ED	80	9200	115	3000	>70	* max +50
130222.5L07X.XX1	ED	80	9550	119	4000	>70	* max +50
130222.5L46X.XX1	ED	106	12100	114	3000	>70	* max +50
130222.5L10X.XX1	ED	106	12550	118	4000	>70	* max +50
Type: O2, O3, O4, O5, O6P, O6L, O7, O8, O26 optics							
130222.5L02X.XX1	ED	29	3150	109	5700	>70	* max +50
130222.5L14X.XX1	ED	37	4100	111	5700	>70	* max +50
130222.5L05X.XX1	ED	55	6100	111	5700	>70	* max +50
130222.5L08X.XX1	ED	80	9550	119	5700	>70	* max +50
130222.5L11X.XX1	ED	106	12550	118	5700	>70	* max +50
Type: OP2 optics							
130222.5L731.111	ED	80	9300	116	3000	>70	* max +50

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 4 / 43
-----------------	----------------	--------------------------	---------------

140222.5L01	1.	Type of luminaires
		985 Luminaire with an additional anti-corrosion protection on request
		874 Annex in the driver chamber without the use of tools on request
		829 Luminaire with holder for mounting on a Ø76mm pillar on request
		Type of optic
	01	02 - for express roads
	02	03 - for local roads
	03	04 - for town roads
	04	05 - for residential area roads
	05	06P - for pedestrian crossings, right side traffic
	06	06L - for pedestrian crossings, left side traffic
	07	07 - for area lighting
	08	08 - for town and local roads
	10	026 - for wet surfaces
	12	033 - for express roads
	13	034 - for local roads
	14	035 - for town roads
	15	036 - for residential area roads
	16	037P - for pedestrian crossings, right side traffic
	17	037L - for pedestrian crossings, left side traffic
	18	038 - for area lighting
	19	039 - for town and local roads
	20	040 - for wet surfaces
	30	013 - for express roads
	31	014 - for local roads
	32	015 - for town roads
	33	016 - for residential area roads
	35	059 - for local roads
	36	060 - for town roads
	37	061 - for residential area roads
		Protection Class
	1	I
	2	II

6. TEST PROGRAM

Name of test	Standards and tests according to		Verdict
	Result	PN – EN 60598 – 2-3	
1	2	3	4
GENERAL TEST REQUIREMENTS			
Information for luminaire design considered	Yes ☒ No ☐	3.2 (0.1)	
More sections applicable	Lamp standard: Yes ☐ No ☒ Section/s:	3.2 (0.3)	
CLASSIFICATION OF LUMINAIRES			
Type of protection	Class I Class II	2.5(2.2)	
Degree of protection	IP 66	2.5(2.3)	
Luminaire suitable for direct mounting on normally flammable surfaces	Yes ☒ No ☐	2.5(2.4)	
Luminaire for normal use	Yes ☒ No ☐	2.5(2.5)	
Luminaire for rough service	Yes ☐ No ☒		
Modes of installation of road or street lighting		3.4(-)	
a) On a pipe	Yes ☒ No ☐		
b) On a mast arm	Yes ☒ No ☐		
c) On a post top	Yes ☒ No ☐		
d) On span or suspension wires	Yes ☐ No ☐		
e) On a wall	Yes ☒ No ☐		
MARKING			
Mandatory markings		3.5(3.2)	P
Position of the markings			P
Format of symbols/text			P
Additional information		3.5(3.3)	P
Combination luminaires			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 5 / 43
-----------------	----------------	--------------------------	---------------

Nominal frequency in Hz		3.5(3.3.2)	P
Operating temperature		3.5(3.3.3)	P
Symbol or warning notice		3.5(3.3.4)	N/A
Wiring diagram		3.5(3.3.5)	P
Special conditions		3.5(3.3.6)	N/A
Metal halide lamp luminaire - warning		3.5(3.3.7)	N/A
Limitation for semi-luminaires		3.5(3.3.8)	N/A
Power factor and supply current		3.5(3.3.9)	P
Suitability for use indoors		3.5(3.3.10)	N/A
Luminaires with remote control		3.5(3.3.11)	N/A
Clip-mounted luminaire-warning		3.5(3.3.12)	N/A
Specifications of protective shields		3.5(3.3.13)	N/A
Symbol for nature of supply		3.5(3.3.14)	N/A
Rated current of socket outlet		3.5(3.3.15)	N/A
Rough service luminaire		3.5(3.3.16)	N/A
Mounting instructions for type Y, type Z and some type X attachments		3.5(3.3.17)	N/A
Non-ordinary luminaires witch PCV cable		3.5(3.3.18)	N/A
Protective conductor current in instruction if applicable		3.5(3.3.19)	N/A
Provided with information if not intendent to be mounted with arm's reach		3.5(3.3.20)	N/A
Non replaceable and non-user replaceable light sources information provided		2.6(3.3.21)	P
Cautionary symbol			P
Controllable luminaires, classification of insulation provided		3.5(3.3.22)	N/A
Test with water		3.5(3.4)	P
Test with hexane			P
Legible after test			P
Label attached			P
Additional information in instruction leaflet		3.5(-)	
a) Design attitude			P
b) Weight			P
c) Overall dimensions			P
d) Maximum projected area if applicable			N/A
e) Cross-sectional area of wires if applicable			N/A
f) Suitability for indoors use			N/A
g) Dimensions of the compartment			N/A
h) Torque setting to be applied to bolts or screws			P
i) Maximum mounting height			P
CONSTRUCTION			
Components replaceable without difficulty		3.6(4.2)	N/A
Wireways smooth and free from sharp edges		3.6(4.3)	N/A
COMPONENT PARTS:			
Lampholders		3.6(4.4)	
Integral lampholder		3.6(4.4.1)	N/A
Wiring connection		3.6(4.4.2)	N/A
Lampholder for end-to-end mounting		3.6(4.4.3)	N/A
Positioning		3.6(4.4.4)	N/A
- pressure test (N):			N/A
After test the lampholder comply with relevant standard sheets and show no damage			N/A
After test on single-capped lampholder the lampholder have not moved from its position and show no permanent deformation			N/A
- bending test (N):			N/A
After test the lampholder have not moved from its position and show no permanent deformation			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 6 / 43
Peak pulse voltage		3.6(4.4.5)	N/A
Centre contact		3.6(4.4.6)	N/A
Parts in rough service luminaires resistant to tracking		3.6(4.4.7)	N/A
Lamp connectors		3.6(4.4.8)	N/A
Caps and bases correctly used		3.6(4.4.9)	N/A
Light source for lampholder or connection according IEC 60061 not connected another way		3.6(4.4.10)	N/A
Starter holders		3.6(4.5)	
Starter holder in luminaires other than class II			N/A
Starter holder class II construction			N/A
Terminal blocks		3.6(4.6)	
Tails			N/A
Unsecured blocks			N/A
Terminals and supply connections		3.6(4.7)	
Contact to metal parts		3.6(4.7.1)	P
Test 8 mm live conductor		3.6(4.7.2)	P
Test 8 mm earth conductor			P
Terminals for supply conductors		3.6(4.7.3)	P
Welded method and material		3.6(4.7.3.1)	
- stranded or solid conductor			P
- spot welding			N/A
- welding between wires			N/A
- Type Z attachment			N/A
- mechanical test according to 15.6.2			N/A
- electrical test according to 15.6.3			N/A
- heat test according to 15.6.3.2.3 and 15.6.3.2.4			N/A
Terminals other than supply connection		3.6(4.7.4)	P
Heat-resistant wiring/sleeves		3.6(4.7.5)	N/A
Multi-pole plug		3.6(4.7.6)	N/A
- test at 30 N			N/A
Switches		3.6(4.8)	
- adequate rating			P
- adequate fixing			P
- polarized supply			P
- compliance with IEC 61058-1 for electronic switches			P
Insulating lining and sleeves		3.6(4.9)	
Retainment		3.6(4.9.1)	N/A
Method of fixing:			N/A
Insulated linings and sleeves:		3.6(4.9.2)	N/A
Resistant to a temperature > 20°C to the wire temperature or			N/A
a) & c) Insulation resistance and electric strength			N/A
b) Ageing test. Temperature (°C):			N/A
Double or reinforced insulation		3.6(4.10)	
No contact, mounting surface – accessible metal parts – wiring of basic insulation	applies to class II	3.6(4.10.1)	P
Safe installation fixed luminaires	applies to class II		P
Capacitors and switches			N/A
Interference suppression capacitors according to IEC 60384-14			N/A
Assembly gaps:		3.6(4.10.2)	
- not coincidental	applies to class II		P
- no straight access with test probe	applies to class II		P
Retainment of insulation:		3.6(4.10.3)	
- fixed	applies to class II		P
- unable to be replaced; luminaire inoperative			N/A
- sleeves retained in position			N/A
- lining in lampholder			N/A
Protective impedance device		3.6(4.10.4)	

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 7 / 43
-----------------	----------------	--------------------------	---------------

Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor			N/A
Y1 or Y2 capacitors comply with IEC 60384-14			N/A
Resistors comply with test (a) in 14.1 of IEC 60065			N/A
Electrical connections and current-carrying parts			
Contact pressure		3.6(4.11.1)	P
Screws:			
- self-tapping screws		3.6(4.11.2)	N/A
- thread-cutting screws			N/A
Screw locking:		3.6(4.11.3)	
- spring washer			N/A
- rivets			N/A
Material of current-carrying parts		3.6(4.11.4)	P
No contact to wood or mounting surface		3.6(4.11.5)	P
Electro-mechanical contact systems		3.6(4.11.6)	N/A
Screws and connections (mechanical) and glands		3.6(4.12)	
Screws not made of soft metal		3.6(4.12.1)	P
Screws of insulating material			N/A
Torque test: torque (Nm); part:	4mm1,2		N/A
Torque test: torque (Nm); part:	5mm2,0		N/A
Torque test: torque (Nm); part:	8mm8,0		N/A
Screws with diameter < 3 mm screwed into metal		3.6(4.12.2)	N/A
Locked connections:		3.6(4.12.4)	P
- fixed arms; torque (Nm):	7Nm		P
- lampholder; torque (Nm):			N/A
- push-button switches; torque (Nm):	0,8		N/A
Screwed glands; force (Nm):		3.6(4.12.5)	—
Mechanical strength		3.6(4.13)	
Impact tests:		3.6(4.13.1)	
- fragile parts; energy (Nm):	0,5		P
- other parts; energy (Nm):	0,7		P
1) live parts			P
2) linings			N/A
3) protection			P
4) covers			P
Straight test finger		3.6(4.13.3)	P
Rough service luminaires		3.6(4.13.4)	
- IP54 or higher			N/A
a) fixed			N/A
b) hand-held			N/A
c) delivered with a stand			N/A
d) for temporary installations and suitable for mounting on a stand			N/A
Tumbling barrel		3.6(4.13.6)	N/A
Suspensions, fixings and means of adjusting		3.6(4.14)	
Mechanical load:		3.6(4.14.1)	
A) four times the weight			N/A
B) torque 2,5 Nm			N/A
C) bracket arm; bending moment (Nm):	7Nm		P
D) load track-mounted luminaires			N/A
E) clip-mounted luminaires, glass-shelve. Thickness (mm):			N/A
Metal rod. diameter (mm):			N/A
Fixed luminaire or independent control gear without fixing devices			N/A
Load to flexible cables		3.6(4.14.2)	
Mass (kg):			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 8 / 43
-----------------	----------------	--------------------------	---------------

Stress in conductors (N/mm ²):			N/A
Mass (kg) of semi-luminaire:			N/A
Bending moment (Nm) of semi-luminaire:			N/A
Adjusting devices:		3.6(4.14.3)	
- flexing test; number of cycles:			N/A
- strands broken:			N/A
- electric strength test afterwards			N/A
Telescopic tubes: cords not fixed to tube; no strain on conductors		3.6(4.14.4)	N/A
Guide pulleys		3.6(4.14.5)	N/A
Strain on socket-outlets		3.6(4.14.6)	N/A
Flammable materials		3.6(4.15)	
- glow-wire test 650°C:		(13.3.2)	N/A
- spacing ≥30 mm			N/A
- screen withstanding test of 13.3.1			N/A
- screen dimensions			N/A
- no fiercely burning material			N/A
- thermal protection			N/A
- electronic circuits exempted			N/A
Luminaires made of thermoplastic material with lamp control gear		3.6(4.15.2)	
a) construction			N/A
b) temperature sensing control			N/A
c) surface temperature			N/A
Luminaires for mounting on normally flammable surfaces		3.6(4.16)	
No lamp control gear:		(compliance with Section 12)	N/A
Lamp control gear spacing:		3.6(4.16.1)	
- spacing 35 mm			N/A
- spacing 10 mm			N/A
Thermal protection:		3.6(4.16.2)	
- in lamp control gear			P
- external			N/A
- fixed position			N/A
- temperature marked lamp control gear	T120		P
Design to satisfy the test of 12.6	(see clause 12.6)	3.6(4.16.3)	N/A
Drain holes		3.6(4.17)	
Clearance at least 5 mm			N/A
Resistance to corrosion		3.6(4.18)	
- rust-resistance		3.6(4.18.1)	N/A
- season cracking in copper		3.6(4.18.2)	N/A
- corrosion of aluminium		3.6(4.18.3)	P
Ignitors compatible with ballast		3.6(4.19)	N/A
Rough service vibration		3.6(4.20)	N/A
Protective shield		3.6(4.21)	
Shield fitted if tungsten halogen lamps or metal halide lamps		3.6(4.21.1)	N/A
Shield of glass if tungsten halogen lamps			N/A
Particles from a shattering lamp not impair safety		3.6(4.21.2)	N/A
No direct path		3.6(4.21.3)	N/A
Impact test on shield		3.6(4.21.4)	
Glow-wire test on lamp compartment:		(13.3.2)	N/A
Attachments to lamps not cause overheating or damage		3.6(4.22)	N/A
Semi-luminaires comply Class II		3.6(4.23)	N/A
Photobiological hazards		3.6(4.24)	
No excessive UV radiation if tungsten halogen lamps and metal halide lamps (Annex P)		3.6(4.24.1)	P
Retinal blue light hazard		3.6(4.24.2)	P

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 9 / 43
Class of risk group assessed according to IEC/TR 62778:	RG1 According to PBS_13_6027_18	BLUE LIGHT $L_B=3670,85 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$ LIMIT FOR RG1 $10000 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$	P
Luminaires with E_{thr} :			
a) Fixed luminaires			
- distance x m, borderline between RG1 and RG2:			N/A
- marking and instruction according 3.2.23			N/A
b) Portable and handheld luminaires			N/A
- marking according 3.2.23 if RG1 exceeded at 200 mm according to IEC/TR 62778			N/A
Portable luminaires for children IEC 60598-2-10 and Mains socket outlet nightlights IEC 60598-2-12 not exceed RG1 at 200 mm according to IEC/62778			N/A
Mechanical hazard		3.6(4.25)	
No sharp point or edges			P
Short-circuit protection		3.6(4.26)	
Adequate means of uninsulated accessible SELV parts		3.6(4.26.1)	N/A
Short-circuit test with test chain according 4.26.3		3.6(4.26.2)	N/A
Test chain not melt through			N/A
Test sample not exceed values of Table 12.1 and 12.2			N/A
Terminal blocks with integrated screwless earthing contacts		3.6(4.27)	
Test according Annex V			—
Pull test of terminal fixing (20 N)			—
After test, resistance < 0,05 Ω			—
Pull test of mechanical connection (50 N)			—
After test, resistance < 0,05 Ω			—
Voltage drop test, resistance < 0,05 Ω			—
Fixing of thermal sensing control		3.6(4.28)	
Not plug-in or easily replaceable type			N/A
Reliably kept in position			N/A
No adhesive fixing if UV radiations from a lamp can degrade the fixing			N/A
Not outside the luminaire enclosure			N/A
Test of adhesive fixing:			
Max. temperature on adhesive material ($^{\circ}\text{C}$):			N/A
100 cycles between t_{min} and t_{max}			N/A
Temperature sensing control still in position			N/A
Luminaires with non-replaceable light source		3.6(4.29)	
Not possible to replace light source			N/A
Live part not accessible after parts have been opened by hand or tools			N/A
Luminaires with non-user replaceable light source		3.6(4.30)	
If protective cover provide protection against electric shock and marked with "caution, electric shock risk" symbol:			P
Minimum two fixing means			N/A
Insulation between circuits		3.6(4.31)	
Circuits insulated from LV supply fulfil requirements according 4.31.1 – 4.31.3			P
Controllable luminaires requiring same level of insulation for all components, the insulation between control terminals and LV supply fulfil requirements according 4.31.1 – 4.31.3			P
SELV circuits		3.6(4.31.1)	N/A
Used SELV source			N/A
Voltage < 50V			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 10 / 43
-----------------	----------------	--------------------------	----------------

Insulating of SELV circuits from LV supply			N/A
Insulating of SELV circuits from other non SELV circuits			N/A
Insulating of SELV circuits from FELV			N/A
Insulating of SELV circuits from other SELV circuits			N/A
SELV circuits insulated from accessible parts according Table X.1			N/A
Plugs not able to enter socket-outlets of other voltage systems			N/A
Socket outlets does not admit plugs of other voltage systems			N/A
Plugs and socket-outlets does not have protective conductor contact			N/A
FELV circuits		3.6(4.31.2)	N/A
Used FELV source			N/A
Voltage ≤ ELV			N/A
Insulating of FELV circuits from LV supply			N/A
FELV circuits insulated from accessible parts according Table X.1			N/A
Plugs not able to enter socket-outlets of other voltage systems			N/A
Socket-outlets does not have protective conductor contact			N/A
Other circuits		3.6(4.31.3)	
Other circuits insulated from accessible parts according Table X.1			N/A
Class II construction with equipotential bonding for protection against indirect contacts with live parts:			
- conductive parts are connected together			N/A
- test according 7.2.3			N/A
- conductive part not cause an electric shock in case of an insulation fault			N/A
- equipotential bonding in master/slave applications			N/A
- master luminaire provided with terminal for accessible conductive parts of slave luminaires			N/A
- slave luminaire constructed as class I			N/A
Overvoltage protective devices		3.6(4.32)	
Comply with IEC 61643-11			P
External to controlgear and connected to earth:			
- only in fixed luminaires			N/A
- only connected to protective earth			N/A
At least IP X3 or X5 respectively. IP:	66	3.6.1(-)	P
Column-integrated luminaires:			
- Parts below 2,5 m. IP:			N/A
- Parts below 2,5 m. IP:			N/A
Suspension on span wires		3.6.2(-)	N/A
Means for attaching the luminaire or external parts its support appropriate to the weight		3.6.3(-)	P
Static load test		3.6.3.1(-)	
- Drag coefficient:	1,2kg/m3		
- Loaded area (m²):	0,134		
- Used load (N):	266,3		
- Measured deformation (cm/m):			P
- No rotation:			P
Adjustable lampholders		3.6.4(-)	N/A
Luminaires installed above 5 m, glass covers shall be:		3.6.5(-)	
a) Glass that fractures into small pieces (test according to 3.6.5.1), or			P
b) Glass having a high impact shock resistance (test according to 3.6.5.2), or			P

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 11 / 43
c) Protect by any means to retain glass fragments			N/A
For tunnel luminaires 3.6.5.1 apply			N/A
Method of protection declared by the manufacturer			N/A
Protection by the use of glass that fractures into small pieces		3.6.5.1(-)	
- Number of particles is more than 40:			P
Protection by the use of high impact resistant glass		3.6.5.2(-)	
Glass covers have high mechanical strength		3.6.5.2.1(-)	P
Test according IEC 62262 with test apparatus according IEC 60068-2-75 with impact energy of 5J on preconditioned sample			P
Glass covers not break into large pieces		3.6.5.2.2(-)	P
- Test according 3.6.5.1, number of particles is more than 20:			P
Connection compartment of column- integrated luminaire		3.6.6(-)	
- Provides adequate space			N/A
- Means for attachment			N/A
- Means for attachment of metal corrosion-resistant			N/A
Compliance with ISO standard or other:		3.6.7(-)	N/A
Doors of column-integrated luminaires:		3.6.8(-)	
- Corrosion-resistant			N/A
- Opening only possible for an authorized person			N/A
- Impact test 5 Nm			N/A
- Sample show no damage			N/A
Column-integrated luminaire:		3.6.9(-)	
- Dimension of the cable entry slot (mm):			N/A
- Cable path from the slot to the connection compartment (mm):			N/A
- Cable path free from obstruction that might cause abrasion of the cable			N/A
CREEPAGE DISTANCES AND CLEARANCES			
Creepage distances and clearances:	See Table 2.8 (11.2)	3.7 (11.2)	P
Working voltage (V):	230V		-----
Voltage form		Sinusoidal ☒ Non-sinusoidal ☐	-----
PTI		<600 ☒ ≥600 ☐	-----
Impulse withstand category (Normal category II) (Category III Annex U, Table U.1)		Category II ☒ Category III ☐	
Rated pulse voltage (kV):			-----
(1) Current-carrying parts of different polarity: cr (mm); cl (mm):			N/A
(2) Current-carrying parts and accessible parts and accessible parts: cr (mm); cl (mm):			N/A
(3) Parts becoming live due to breakdown of basic insulation and metal parts: cr (mm); cl (mm):			N/A
(4) Outer surface of cable where it is clamped and metal: cr (mm); cl (mm):			N/A
(6) Current-carrying parts and supporting surface: cr (mm); cl (mm):			N/A
PROVISION FOR EARTHING			
Accessible metal parts	applies to class I	3.8 (7.2.1 + 7.2.3)	P
Metal parts in contact with supporting surface			P
Resistance < 0,5 Ω:	clamp - body clamp - reflector		P
Self-lapping screws used			P

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 12 / 43
-----------------	----------------	--------------------------	----------------

Thread-forming screws			N/A
Thread-forming screw used in a groove			N/A
Earth makes contact first			P
Terminal blocks with integrated screwless earthing contacts tested according Annex V			P
Protective earthing of the luminaire not via built-in control gear			P
Earth continuity in joints, etc.	applies to class I	3.8 (7.2.2 + 7.2.3)	N/A
Locking of clamping means	applies to class I	3.8 (7.2.4)	P
Compliance with 4.7.3			P
Terminal blocks with integrated screwless earthing contacts tested according Annex V			P
Earth terminal integral part of connector socket	applies to class I	3.8 (7.2.5)	N/A
Earth terminal adjacent to mains terminals	applies to class I	3.8 (7.2.6)	P
Electrolytic corrosion of the earth terminal	applies to class I	3.8 (7.2.7)	P
Material of earth terminal	applies to class I	3.8 (7.2.8)	P
Contact surface bare metal			P
Class II luminaire for looping-in	applies to class I	2.9 (7.2.10)	N/A
Double or reinforced insulation to functional earth			N/A
Earthing core coloured green-yellow	applies to class I	3.8 (7.2.11)	P
Length of earth conductor			P
SCREW TERMINALS			
Separately approved; component list		3.9 (14)	—
Part of the luminaire	(see Annex 1)	3.9 (14)	—
SCREWLESS TERMINALS AND ELECTRICAL CONNECTIONS			
Separately approved; component list:		3.9 (15)	—
Part of the luminaire:	(see Annex 2)	3.9 (15)	—
EXTERNAL AND INTERNAL WIRING			
Supply connection and external wiring		3.10 (5.2)	
Means of connection:	connector	3.10 (5.2.1)	P
Outdoor luminaire has not PVC insulated external wiring if not class III or SELV ≤ 25 V a.c./60 V d.c. or protected from outdoor environment			N/A
Type of cable:		3.10 (5.2.2)	N/A
Nominal cross-sectional area (mm ²):			N/A
Cables equal to IEC 60227 or IEC 60245			N/A
Type of attachment, X, Y or Z		3.10 (5.2.3)	N/A
Type Z not connected to screws		3.10 (5.2.5)	N/A
Cable entries:		3.10 (5.2.6)	N/A
- suitable for introduction			N/A
- adequate degree of protection			N/A
Cable entries through rigid material have rounded edges		3.10 (5.2.7)	N/A
Insulating bushings:		3.10 (5.2.8)	
- suitably fixed			N/A
- material in bushings			N/A
- material not likely to deteriorate			N/A
- tubes or guards made of insulating material			N/A
Locking of screwed bushings		3.10 (5.2.9)	N/A
Cord anchorage:		3.10 (5.2.10)	
- covering protected from abrasion			N/A
- clear how to be effective			N/A
- no mechanical or thermal stress			N/A
- no tying of cables into knots etc.			N/A
- insulating material or lining			N/A
Cord anchorage for type X attachment:		3.10 (5.2.10.1)	
a) at least one part fixed			N/A
b) types of cable			N/A
c) no damaging of the cable			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 13 / 43
-----------------	----------------	--------------------------	----------------

d) whole cable can be mounted			N/A
e) no touching of clamping screws			N/A
f) metal screw not directly on cable			N/A
g) replacement without special tool			N/A
Glands not used as anchorage			N/A
Labyrinth type anchorages			N/A
Adequate cord anchorage for type Y and type Z attachment		3.10 (5.2.10.2)	N/A
Tests:		3.10 (5.2.10.3)	
- impossible to push cable; unsafe			P
- pull test: 25 times; pull (N):	80		P
- torque test: torque (Nm):	0,35		P
- displacement ≤ 2 mm			P
- no movement of conductors			P
- no damage of cable or cord			P
- function independent of electrical connection			P
External wiring passing into luminaire		3.10 (5.2.11)	P
Looping-in terminals		3.10 (5.2.12)	N/A
Wire ends not tinned		3.10 (5.2.13)	P
Wire ends tinned: no cold flow			P
Mains plug same protection		3.10 (5.2.14)	N/A
Class III luminaire plug			N/A
No unsafe compatibility			
Appliance inlets (IEC 60320)		3.10 (5.2.16)	N/A
Installation couplers (IEC 61535)			N/A
Other appliance inlet or connector according relevant IEC standard			N/A
No standardized interconnecting cables properly assembled		3.10 (5.2.17)	N/A
Used plug in accordance with		3.10 (5.2.18)	N/A
- IEC 60083			N/A
- other standard			N/A
Internal wiring		3.10 (5.3)	
Internal wiring of suitable size and type	DYCYC 0,5 750V	3.10 (5.3.1)	P
Through wiring			P
- not delivered/ mounting instruction			N/A
- factory assembled			P
- socket outlet loaded (A):			N/A
- temperatures:	(see Annex 3)		P
Green-yellow for earth only	applies to class I		P
Internal wiring connected directly to fixed wiring	DYCYC 0,5 750V	3.10 (5.3.1.1)	P
Cross-sectional area (mm ²):	0,5		P
Insulation thickness			P
Extra insulation added where necessary			P
Internal wiring connected to fixed wiring via internal current-limiting device		3.10 (5.3.1.2)	
Adequate cross-sectional area and insulation thickness			N/A
Double or reinforced insulation for class II		3.10 (5.3.1.3)	P
Conductors without insulation		3.10 (5.3.1.4)	N/A
SELV current-carrying parts		3.10 (5.3.1.5)	N/A
Insulation thickness other than PVC or rubber		3.10 (5.3.1.6)	N/A
Sharp edges etc.		3.10 (5.3.2)	
No moving parts of switches etc.			P
Joints, raising/lowering devices			P
Telescopic tubes etc.			N/A
No twisting over 360°			P
Insulating bushings:		3.10 (5.3.3)	

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 14 / 43
-----------------	----------------	--------------------------	----------------

- suitable fixed			N/A
- material in bushings			N/A
- material not likely to deteriorate			N/A
- cables with protective sheath			N/A
Joints and junctions effectively insulated		3.10 (5.3.4)	P
Strain on internal wiring		3.10 (5.3.5)	N/A
Wire carriers		3.10 (5.3.6)	N/A
Wire ends not tinned		3.10 (5.3.7)	P
Wire ends tinned: no cold flow			P
PROTECTION AGAINST ELECTRIC SHOCK			
Live parts not accessible		3.11 (8.2.1)	P
Basic insulated parts not used on the outer surface without appropriate protection, includes ceiling void.			P
Basic insulated parts not accessible with Ø 50 mm probe from outside, other types of luminaires			P
Lamp and starterholders in portable and adjustable luminaires comply with double or reinforced insulation requirements			N/A
Basic insulation only accessible under lamp or starter replacement			N/A
Protection in any position			P
Double-ended tungsten filament lamp			N/A
Insulation lacquer not reliable			P
Double-ended high pressure discharge lamp			N/A
Relevant warning according to 3.2.18 fitted to the luminaire			N/A
Portable luminaire adjusted in most unfavourable position			N/A
Class II luminaire:		3.11 (8.2.2)	
- basic insulated metal parts not accessible during starter or lamp replacement		3.11 (8.2.3.a)	N/A
- basic insulation not accessible other than during starter or lamp replacement			N/A
- glass protective shields not used as supplementary insulation			N/A
BC lampholder of metal in class I luminaires shall be earthed			N/A
SELV circuits with exposed current carrying parts:		3.11 (8.2.3.b)	
Ordinary luminaire:		3.11 (8.2.3.c)	
- voltage under load (V):			N/A
- no-load voltage (V):			N/A
- touch current if applicable (mA):			N/A
One conductive part insulated if required			
Other than ordinary luminaire:			
- nominal voltage (V):		3.11 (8.2.4)	N/A
Class III luminaire only for connection to SELV		3.11 (8.2.5)	N/A
Portable luminaire have protection independent of supporting surface		3.11 (8.2.6)	P
Compliance with the standard test finger or relevant probe		3.11 (8.2.7)	N/A
Covers reliably secured			N/A
Luminaire other than below with capacitor > 0,5 µF not exceed 50 V 1 min after disconnection			N/A
Portable luminaire with capacitor > 0,1 µF (0.25) not exceed 34 V 1 s after disconnection			N/A
Other luminaires with capacitor > 0,1 µF (0.25) with plug and track adaptors not exceed 60 V 5 s after disconnection			N/A
ENDURANCE TEST AND THERMAL TEST			

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 15 / 43
If IP > IP 20 relevant test of (12.4), (12.5), (12.6) & (12.7) after (9.2) before (9.3) specified in 2.14		3.12.2 (-)	P
Endurance test:		3.12 (12.3)	P
- mounting-position:	on the pole		
- test temperature (°C):	55		
- total duration (h):	240		
- supply voltage: Un factor; calculated voltage (V):	264		
- lamp used:	LUG ML1500302.W740.03A		
After endurance test:		3.12 (12.3.2)	
- no part unserviceable			P
- luminaire not unsafe			P
- no damage to track system			N/A
- marking legible			P
- no cracks, deformation etc.			P
Thermal test (normal operation)	(see Annex 3)	3.12 (12.4)	P
Thermal test (abnormal operation)	(see Annex 3)	3.12 (12.5)	N/A
Thermal test (failed lamp control gear condition):		3.12 (12.6)	N/A
Through wiring or looping-in wiring loaded by a current of (A):		3.12 (12.6.1)	N/A
- case of abnormal conditions:			N/A
- electronic lamp control gear			N/A
- measured winding temperature (°C): at 1,1 Un:			N/A
- measured mounting surface temperature (°C) at 1,1 Un:			N/A
- calculated mounting surface temperature (°C):			N/A
- track-mounted luminaires			N/A
Temperature sensing control		3.12 (12.6.2)	
- case of abnormal conditions:			N/A
- thermal link			N/A
- manual reset cut-out			N/A
- auto reset cut-out			N/A
- measured mounting surface temperature (°C):			N/A
- track-mounted luminaires			N/A
Thermal test (failed lamp control gear in plastic luminaires):		3.12 (12.7)	N/A
Luminaire without temperature sensing control		3.12 (12.7.1)	N/A
Luminaire with fluorescent lamp ≤ 70W		3.12 (12.7.1.1)	N/A
Test method 12.7.1.1 or Annex W:			N/A
Test according to 12.7.1.1:			N/A
- case of abnormal conditions:			N/A
- Ballast failure at supply voltage (V):			N/A
- Components retained in place after the test			N/A
- Test with standard test finger after the test			N/A
Test according to Annex W:			N/A
- case of abnormal conditions:			N/A
- measured winding temperature (°C): at 1,1 Un:			N/A
- measured temperature of fixing point/exposed part (°C): at 1,1 Un:			N/A
- calculated temperature of fixing point/exposed part (°C):			N/A
Ball-pressure test:	See Table 2.16 (13.2.1)		N/A
Luminaire with discharge lamp, fluorescent lamp > 70W, transformer > 10 VA		3.12 (12.7.1.2)	N/A
- case of abnormal conditions:			N/A
- measured winding temperature (°C): at 1,1 Un:			N/A
- measured temperature of fixing point/exposed part (°C): at 1,1 Un:			N/A
- calculated temperature of fixing point/exposed part (°C):			N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 16 / 43
Ball-pressure test:	See Table 2.16 (13.2.1)		N/A
Luminaire with short circuit proof transformers ≤ 10 VA		3.12 (12.7.1.3)	N/A
- case of abnormal conditions:			N/A
- Components retained in place after the test			N/A
- Test with standard test finger after the test			N/A
Luminaire with temperature sensing control		3.12 (12.7.2)	N/A
- thermal link:		Yes ☐ No ☐	
- manual reset cut-out:		Yes ☐ No ☐	
- auto reset cut-out:		Yes ☐ No ☐	
- case of abnormal conditions:			N/A
- measured temperature of fixing point/exposed part ($^{\circ}\text{C}$): at 1,1 Un:			N/A
Ball-pressure test:	See Table 2.16 (13.2.1)		P
Wiring, for connection to the supply, not reach unsafe temperature		3.12.1(-)	P
- measured temperature of the cable ($^{\circ}\text{C}$):	35	3.12.2(-)	P
RESISTANCE TO DUST AND MOISTURE			
If IP > IP 20 the order of tests as specified in clause 2.14		3.13.1 (-)	
Tests for ingress of dust, solid objects and moisture:		3.13 (9.2)	P
- classification according to IP:	66		-----
- mounting position during test:	on the pole		-----
- fixing screws tightened; torque (Nm):	7		-----
- tests according to clauses:	9.2.2,9.2.6		-----
- electric strength test afterwards			P
a) no deposit in dust-proof luminaire			P
b) no talcum in dust-tight luminaire			N/A
c) no trace of water on current-carrying parts or on insulation where it could become a hazard			P
c.1) For luminaires without drain holes – no water entry			P
c.2) For luminaires with drain holes – no hazardous water entry			N/A
d) no water in watertight or pressure watertight luminaire			P
e) no contact with live parts (IP 2X)			N/A
e) no entry into enclosure (IP 3X and IP 4X)			N/A
e) no contact with live parts through drain holes and ventilation slots (IP3X and IP4X)			N/A
f) no trace of water on part of lamp requiring protection from splashing water			N/A
g) no damage of protective shield or glass envelope			P
Humidity test 48 h		3.13 (9.3)	P
INSULATION RESISTANCE AND ELECTRIC STRENGTH			
Insulation resistance test		3.14 (10.2.1)	
Cable or cord covered by metal foil or replaced by a metal rod of mm $\varnothing$:			—
Insulation resistance (M Ω):	1G Ω		P
SELV			
- between current-carrying parts of different polarity :	>110M Ω		N/A
- between current-carrying parts and mounting surface:	>110M Ω		N/A
- between current-carrying parts and metal parts of the luminaire:	>110M Ω		N/A
- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts:			N/A
- Insulation bushings as described in Section 5:			N/A
Other than SELV			
- between live parts of different polarity:	>550M Ω		—

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 17 / 43
- between live parts and mounting surface:	>550MΩ		P
- between live parts and metal parts:	>550MΩ		P
- between live parts of different polarity through action of a switch:			N/A
- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts:			N/A
- Insulation bushings as described in Section 5:			
Electric strength test		3.14 (10.2.2)	
Dummy lamp			P
Luminaires with ignitors after 24 h test			N/A
Luminaires with manual ignitors			N/A
Test voltage (V):	CL I 1480V CL II 2960V		P
SELV			
- between current-carrying parts of different polarity :	500V		N/A
- between current-carrying parts and mounting surface:	500V		N/A
- between current-carrying parts and metal parts of the luminaire:	500V		N/A
- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts:			N/A
- Insulation bushings as described in Section 5:			N/A
Other than SELV			
- between live parts of different polarity:	CL I 1480V CL II 2960V		—
- between live parts and mounting surface:	CL I 1480V CL II 2960V		P
- between live parts and metal parts:	CL I 1480V CL II 2960V		P
- between live parts of different polarity through action of a switch:			N/A
- between the outer surface of a flexible cord or cable where it is clamped in a cord anchorage and accessible metal parts:			N/A
- Insulation bushings as described in Section 5:			—
Touch current or protective conductor current (mA):	0,005	3.14 (10.3)	P
RESISTANCE TO HEAT, FIRE AND TRACKING			
Ball-pressure test:	See Test Table 2.16 (13.2.1)	(13.2.1)	N/A
Needle-flame test (10 s):	See Test Table 2.16 (13.3.1)	(13.3.1)	N/A
Glow-wire test (650°C):	See Test Table 2.16 (13.3.2)	(13.3.2)	N/A
Proof tracking test (IEC 60112):	See Test Table 2.16 (13.4)	(13.4)	N/A
ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)			
DK: power supply cord with label		(3.3)	N/A
IT: Warning label on class 0 luminaire			N/A
DK: Socket - outlets		(4.5.1)	N/A
CY, DK, FI, SE, GB: type plug		(4.2.1)	N/A
ANNEX ZC, NATIONAL DEVIATIONS (EN)			
FR: Socket outlets		(4 & 5)	N/A
FR: Glow wire test 850°C alt. 750°C for luminaires in premises open to public or 960°C for luminaires in emergency exits		(13.3)	N/A
GB: Requirements according to United Kingdom Building Regulation		(13.3)	N/A

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 18 / 43
-----------------	----------------	--------------------------	----------------

2.8 (11.2)	TABLE: Creepage distances and clearances Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages Applicable part of IEC 60598-1 Table 11.1* and 11.2*						
	Insulation type **	Measured clearance	Required		Measured creepage	Required	
			clearance	*Table		creepage	*Table
Distance 1:	B	>2,5	2,5	2,5	>2,5	2,5	2,5
Working voltage (V):					250V		-----
PTI:					< 600 ☒	> 600 ☐	-----
Pulse voltage if applicable (kV):							-----
Supplementary information:							
Distance 2:							
Working voltage (V):							-----
PTI:					< 600 ☐	> 600 ☐	-----
Pulse voltage if applicable (kV):							-----
Supplementary information:							
Distance 3:							
Working voltage (V):							-----
PTI:					< 600 ☐	> 600 ☐	-----
Pulse voltage if applicable (kV):							-----
Supplementary information:							

** Insulation type: B – Basic; S – Supplementary; R – Reinforced. See also IEC 60598-1 Annex M.

2.16 (13.2.1)	TABLE: Ball Pressure Test of Thermoplastics			
Allowed impression diameter (mm):				-----
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Supplementary information:				

2.16 (13.3.1)	TABLE: Needle-flame test (IEC 60695-11-5)				
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta) (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict

Supplementary information:					

2.16 (13.3.2)	TABLE: Glow-wire test (IEC 60695-2-11)			
Glow wire temperature:		650°C		-----
Object/ Part No./ Material	Manufacturer/ trademark	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict

Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No):				
Supplementary information:				

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 19 / 43
-----------------	----------------	--------------------------	----------------

2.16 (13.4)	TABLE: Proof tracking test (IEC 60112)			
Test voltage PTI:	175V			-----
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens		Verdict

Supplementary information:				

ANNEX 1: SCREW TERMINALS (PART OF THE LUMINAIRE)

Name of test	Standards and tests according to		Verdict
	Result	PN – EN 60598 – 2-2	
1	2	3	4
SCREW TERMINALS		(14)	
Type of terminal:		(14.2)	-----
Rated current (A):			-----
One or more conductors		(14.3.2.1)	---
Special preparation		(14.3.2.2)	---
Terminal size		(14.3.2.3)	---
Cross-sectional area (mm ²):			-----
Conductor space (mm):		(14.3.3)	---
Mechanical tests		(14.4)	---
Minimum distance		(14.4.1)	---
Cannot slip out		(14.4.2)	---
Special preparation		(14.4.3)	---
Nominal diameter of thread (metric ISO thread):	M	(14.4.4)	---
External wiring			---
No soft metal			---
Corrosion		(14.4.5)	---
Nominal diameter of thread (mm):		(14.4.6)	---
Torque (Nm):			---
Between metal surfaces		(14.4.7)	---
Lug terminal			---
Mantle terminal			---
Pull test; pull (N):			---
Without undue damage		(14.4.8)	---

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 20 / 43
-----------------	----------------	--------------------------	----------------

ANNEX 2: SCREWLESS TERMINALS (PART OF THE LUMINAIRE)

Name of test	Standards and tests according to		Verdict
	Result	PN – EN 60598 – 2-2	
1	2	3	4
SCREWLESS TERMINALS		(15)	
Type of terminal:		(15.2)	-----
Rated current (A):			-----
Material		(15.3.1)	---
Clamping		(15.3.2)	---
Stop		(15.3.3)	---
Unprepared conductors		(15.3.4)	-----
Pressure on insulating material		(15.3.5)	---
Clear connection method		(15.3.6)	---
Clamping independently		(15.3.7)	---
Fixed in position		(15.3.8)	---
Conductor size		(15.3.10)	---
Type of conductor			---
Terminals and connections for internal wiring		(15.5)	---
Mechanical tests		(15.5.1)	---
Pull test spring-type terminals (4 N, 4 samples):		(15.5.1.1.1)	---
Pull test pin or tab terminals (4 N, 4 samples):		(15.5.1.1.2)	---
Insertion force not exceeding 50 N			---
Permanent connections: pull-off test (20 N)		(15.5.1.2)	---
Electrical tests		(15.5.2)	---
Voltage drop (mV) after 1 h (4 samples):			---
Voltage drop of two inseparable joints			---
Number of cycles:			-----
Voltage drop (mV) after 10th alt. 25th cycle (4 samples):			---
Voltage drop (mV) after 50th alt. 100th cycle (4 samples):			---
After ageing, voltage drop (mV) after 10th alt. 25 th cycle (4 samples):			---
After ageing, voltage drop (mV) after 50th alt. 100 th cycle (4 samples):			---
Terminals and connections for external wiring		(15.6)	---
Conductors		(15.6.1)	---
Terminal size and rating			---
Mechanical tests		15.6.2	---
Pull test spring-type terminals or welded connections (4 samples); pull (N):		(15.6.2.1)	---
Pull test pin or tab terminals (4 samples); pull (N):		(15.6.2.2)	---
Electrical tests		(15.6.3)	---
Tests according 15.6.3.1 + 15.6.3.2 in IEC 60598-1			---

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 21 / 43
-----------------	----------------	--------------------------	----------------

ANNEX 3: TABLE: TEMPERATURE MEASUREMENTS, THERMAL TEST OF SECTION 12
25W 130222.5L012.031 @700mA

Name of test 1	Result 2
Type of reference:	130222.5L012.031
Lamp used:	LUG ML1500300.W740.02A
Lamp control gear used:	PHILIPS XITANIUM Lite Prog 40W 0.3-1.0A sXt
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	27,7
Supply current (A):	0,125
Power factor:	0,960
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	49,4			85		
LED MODULE	51,1			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 55^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 85,2%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 22 / 43
-----------------	----------------	--------------------------	----------------

25W 130222.5L011.031@700mA

Name of test 1	Result 2
Type of reference:	130222.5L011.031
Lamp used:	LUG ML1500300.W740.02A
Lamp control gear used:	OSRAM OPTOTRONIC OT 50/120-277/700 P5
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	29,0
Supply current (A):	0,139
Power factor:	0,906
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	49,1			80		
LED MODULE	51,2			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 55^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 87,6%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 23 / 43
-----------------	----------------	--------------------------	----------------

34W 130222.5L132.031@700mA

Name of test 1	Result 2
Type of reference:	130222.5L132.031
Lamp used:	LUG ML1500301.W740.05A
Lamp control gear used:	PHILIPS XITANIUM Lite Prog 40W 36,10.3-1.0A sXt
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	36,1
Supply current (A):	0,162
Power factor:	0,971
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	55,3			85		
LED MODULE	54,5			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 54^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 87,6%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 24 / 43
-----------------	----------------	--------------------------	----------------

34W 130222.5L131.031@700mA

Name of test 1	Result 2
Type of reference:	130222.5L131.031
Lamp used:	LUG ML1500301.W740.05A
Lamp control gear used:	OSRAM OPTOTRONIC OT 50/120-277/700 P5
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	37,1
Supply current (A):	0,173
Power factor:	0,934
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	51,7			80		
LED MODULE	55,0			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 53^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 90,7%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 25 / 43
-----------------	----------------	--------------------------	----------------

50W 130222.5L042.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L042.031
Lamp used:	LUG ML1500301.W740.04A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/800 2 DIMLT2 P
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	55,6
Supply current (A):	0,259
Power factor:	0,932
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	54,9			85		
LED MODULE	64,9			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 45^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 89,1%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 26 / 43
-----------------	----------------	--------------------------	----------------

50W 130222.5L041.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L041.031
Lamp used:	LUG ML1500301.W740.04A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/700 P5
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	54,5
Supply current (A):	0,252
Power factor:	0,938
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	59,0			85		
LED MODULE	63,9			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 45^\circ\text{C}$; T_a out side = $-40 \div 55^\circ\text{C}$; efficiency 90,6%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 27 / 43
-----------------	----------------	--------------------------	----------------

76W 130222.5L071.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L071.031
Lamp used:	LUG ML1401010.W740.03A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/700 P5
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	79,6
Supply current (A):	0,357
Power factor:	0,967
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	65,6			85		
LED MODULE	67,5			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 40^\circ\text{C}$; T_a out side = $-40 \div 50^\circ\text{C}$; efficiency 91,5%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 28 / 43
-----------------	----------------	--------------------------	----------------

76W 130222.5L072.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L072.031
Lamp used:	LUG ML1401010.W740.03A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/800 2 DIMLT2 P
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	80,9
Supply current (A):	0,366
Power factor:	0,960
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	62,3			85		
LED MODULE	69,2			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 40^\circ\text{C}$; T_a out side = $-40 \div 50^\circ\text{C}$; efficiency 91,8%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 29 / 43
-----------------	----------------	--------------------------	----------------

100W 130222.5L102.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L102.031
Lamp used:	LUG ML1500302.W740.03A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/800 2 DIMLT2 P
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	106,4
Supply current (A):	0,476
Power factor:	0,972
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	68,5			85		
LED MODULE	71,8			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 38^\circ\text{C}$; T_a out side = $-40 \div 48^\circ\text{C}$; efficiency 93,0%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 30 / 43
-----------------	----------------	--------------------------	----------------

100W 130222.5L101.031@700mA

Name of test	Result
1	2
Type of reference:	130222.5L101.031
Lamp used:	LUG ML1500302.W740.03A
Lamp control gear used:	OSRAM OPTOTRONIC OT 100/120-277/700 P5
Mounting position of luminaire:	ON THE POLE
Supply wattage (W):	104,0
Supply current (A):	0,463
Power factor:	0,977
Table: measured temperatures corrected for $t_a = 25^\circ\text{C}$	
- abnormal operating mode	N/A
- test 1: rated voltage:	240V
- test 2: 1,06 times rated voltage or 1,05 times rated wattage:	
- test 3: Load on wiring to socket-outlet, 1,06 voltage or 1,05 times wattage:	
- test 4: 1,1 times rated voltage or 1,05 times rated wattage:	
Through wiring or looping-in wiring loaded by a current of A during the test:	

Temperature measurements, ($^\circ\text{C}$)						
Part	Clause 12.4 - normal				Clause 12.5 - abnormal	
	Test 1	Test 2	Test 3	Limit	Test 4	Limit
LED DRIVER	75,4			85		
LED MODULE	71,2			85		
Supplementary information : test results meets requirements, T_a in side = $-40 \div 34^\circ\text{C}$; T_a out side = $-40 \div 44^\circ\text{C}$; efficiency 93,2%						

F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 31 / 43
-----------------	----------------	--------------------------	----------------

ANNEX 4: IK TESTS

IK	m [kg]	h [m]	PART TESTED				
			No.	GLASS DIFFUSER			
02	0,23	0.087	1.	—	—	—	—
			2.	—	—	—	—
			3.	—	—	—	—
03	0,23	0.150	1.	—	—	—	—
			2.	—	—	—	—
			3.	—	—	—	—
04	0,23	0.21	1.	—	—	—	—
			2.	—	—	—	—
			3.	—	—	—	—
05	0,23	0.30	1.	—	—	—	—
			2.	—	—	—	—
			3.	—	—	—	—
06	0,23	0.43	1.	—	—	—	—
			2.	—	—	—	—
			3.	—	—	—	—
07	0,51	0.39	1.	P	—	—	—
			2.	P	—	—	—
			3.	P	—	—	—
08	1,69	0.30	1.	P	—	—	—
			2.	P	—	—	—
			3.	P	—	—	—
09	5,04	0.2	1.	P	—	—	—
			2.	P	—	—	—
			3.	P	—	—	—
10	5,04	0.4	1.	N	—	—	—
			2.	N	—	—	—
			3.	N	—	—	—

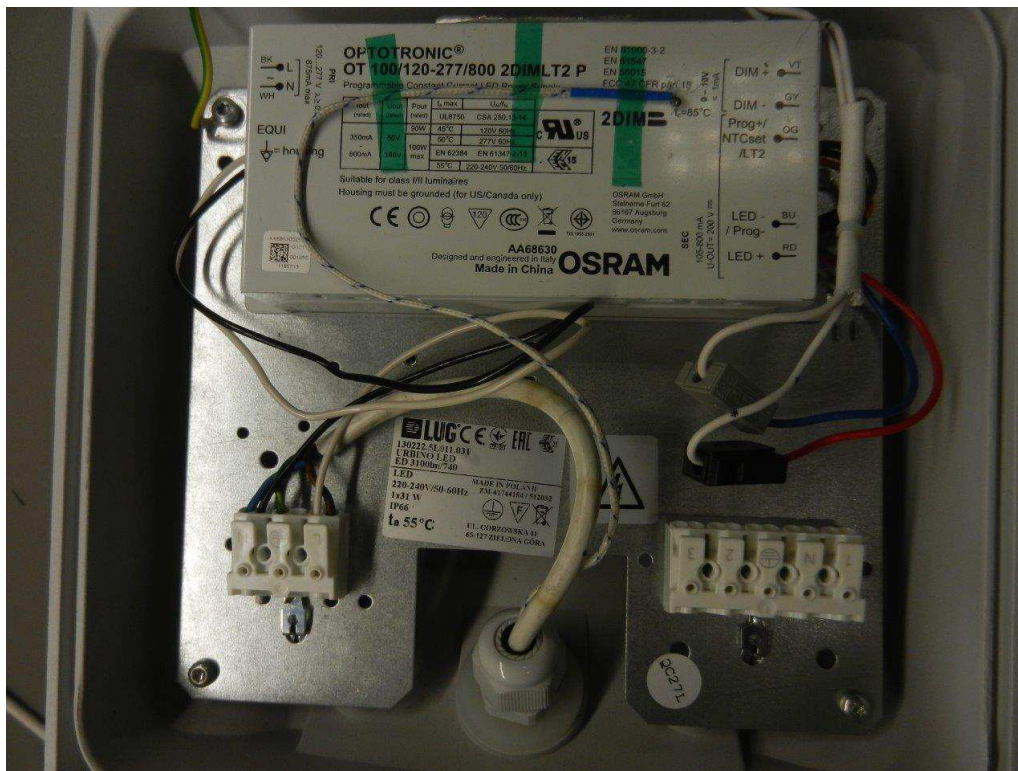
TEST RESULT IK: 09

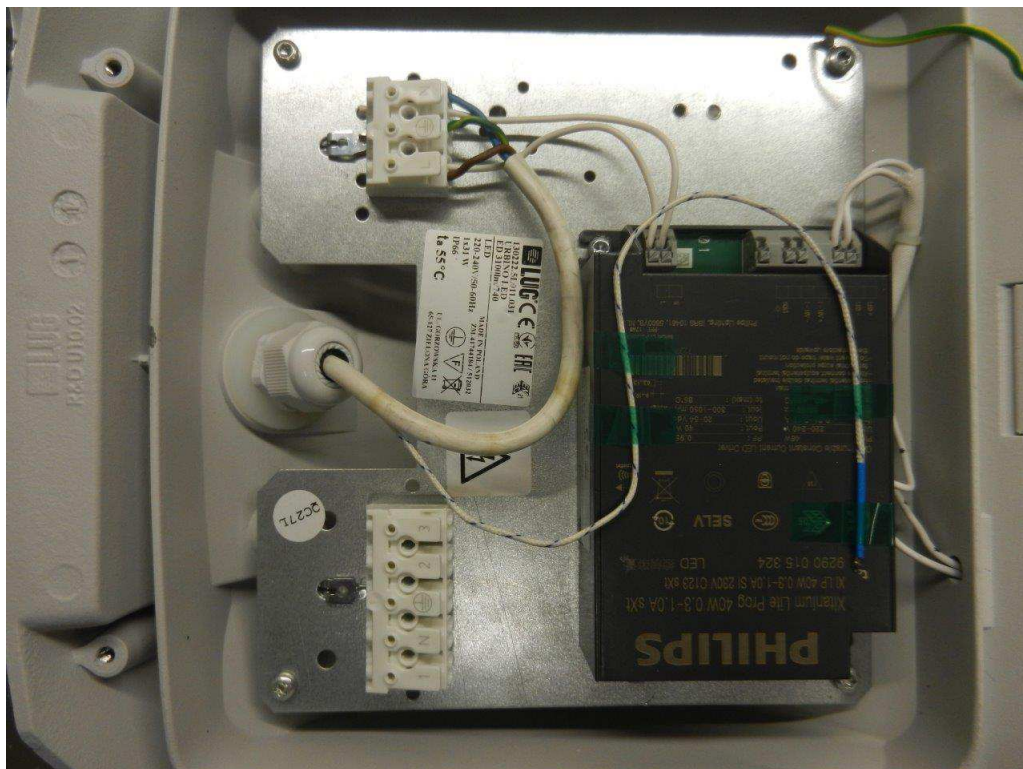
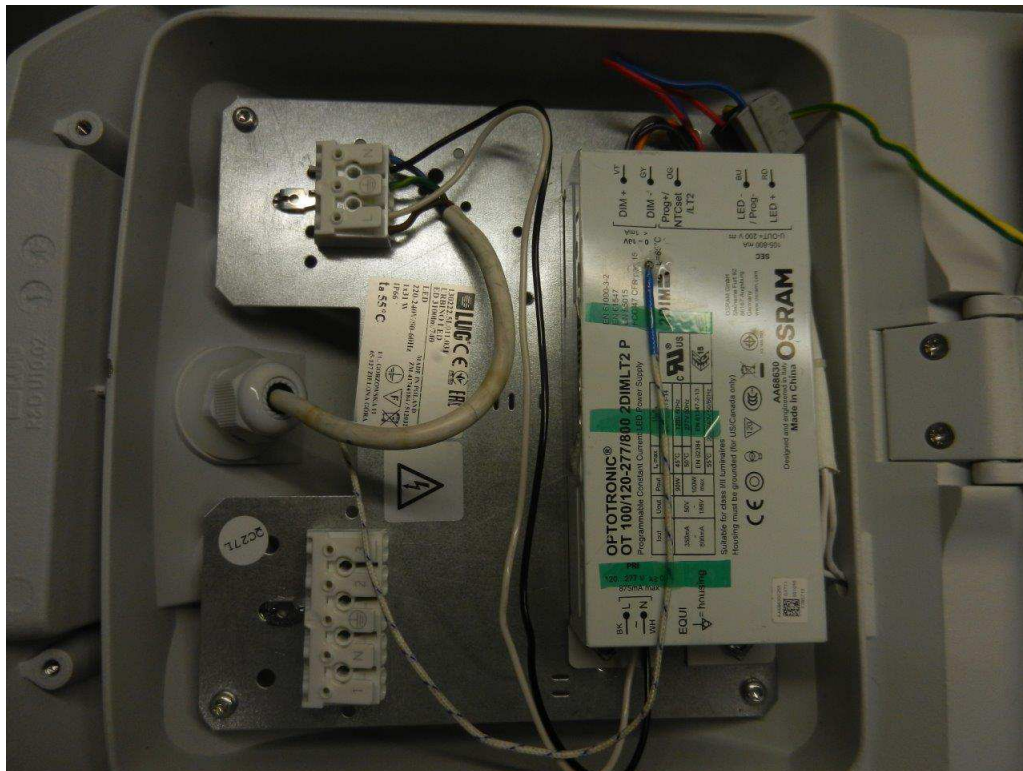
COMMENTS:

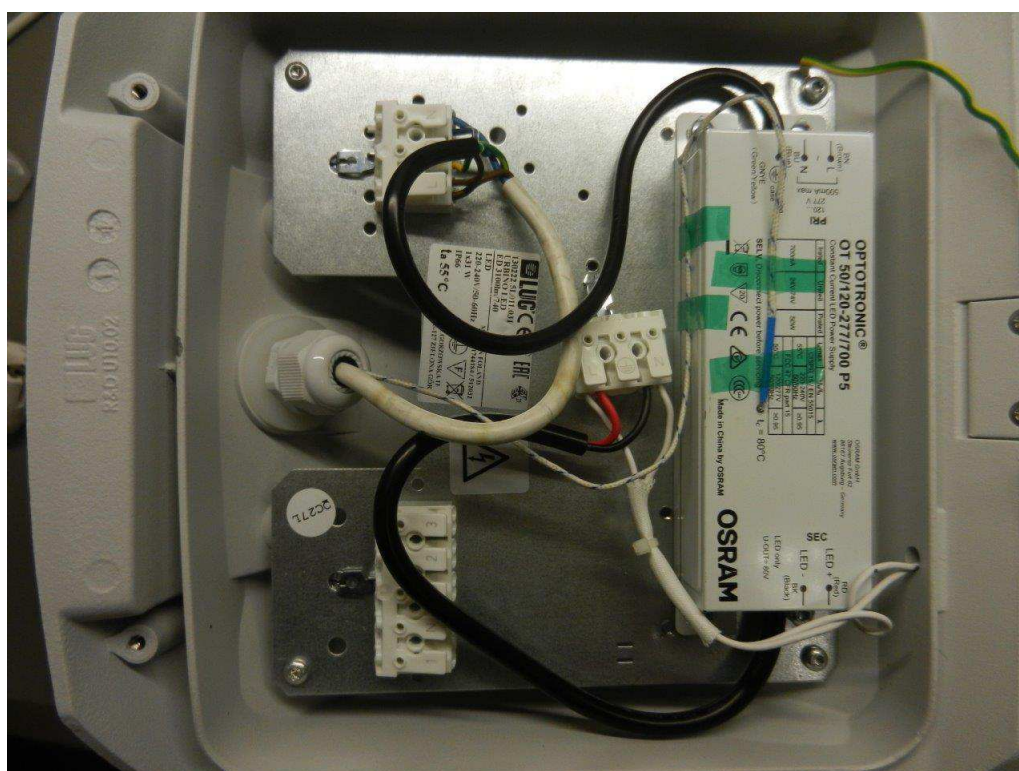
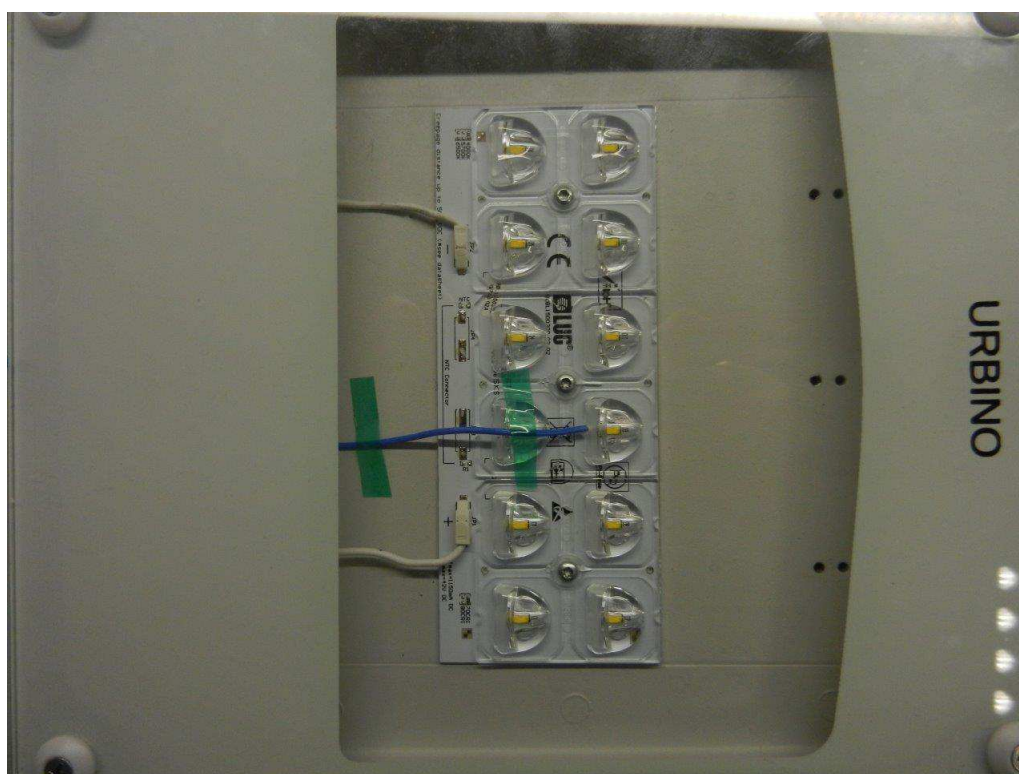
F – 06e/POL - 1	Nr wydania: 03	Data wydania: 31.10.2018	Strona 32 / 43
-----------------	----------------	--------------------------	----------------

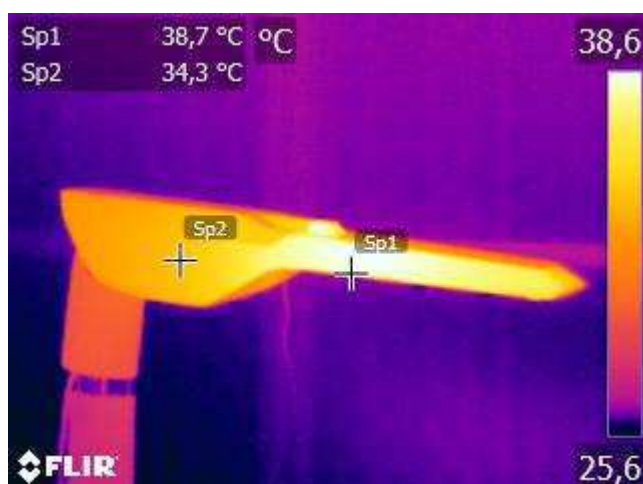
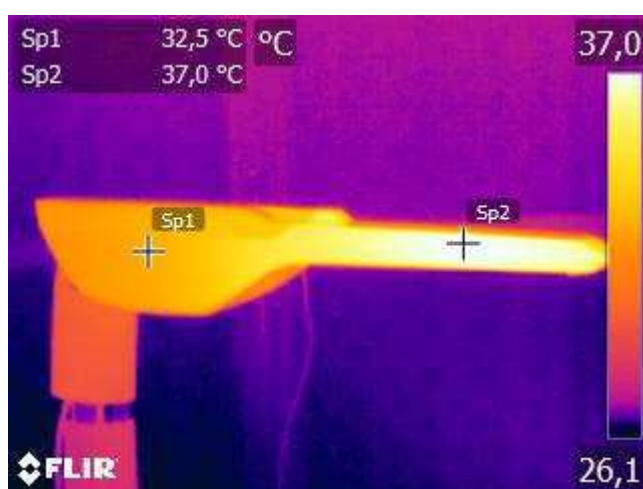
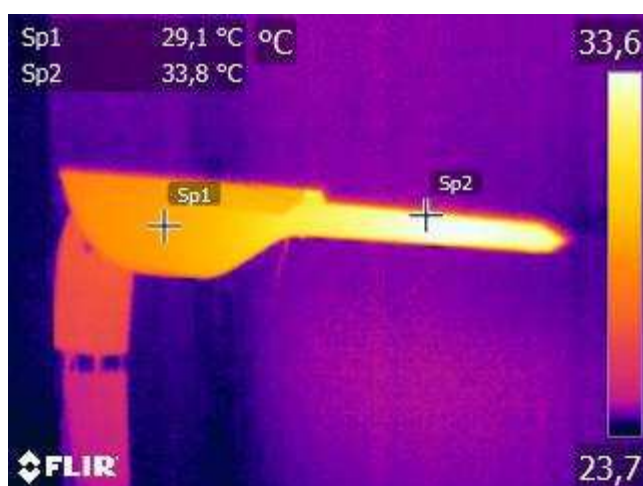
ANNEX 5: LIST OF MEASURING APPARATUS USED IN TESTS

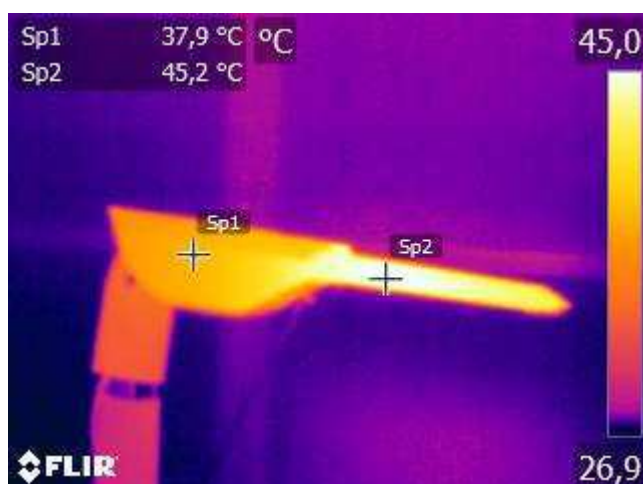
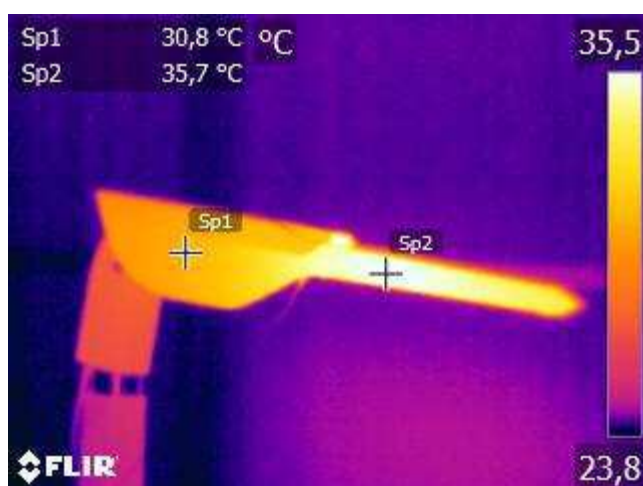
NO.	EQUIPMENT	PRODUCER/ TYPE	SERIES	MARK	USED
ENDURANCE AND THERMAL TEST					
1.	MULTIMETER	BRYMEN/ BM807	061101049	LAB/PP/17	☐
2.	DIGITAL THERMOMETER 1	LUTON/ TM-947SD	288855	LAB/PP/05	☐
3.	DIGITAL THERMOMETER 2	LUTON/ TM-947SD	1416488	LAB/PP/06	☐
4.	DIGITAL MULTIMETER	TEKTRONIX/ DMM4020	2475006	LAB/PP/03	☐
5.	DIGITAL MULTIMETER	TEKTRONIX/ DMM4020	2566126	LAB/PP/04	☐
6.	SYSTEM ENERGY MULTIMETER	EVERFINE/ PF 9811	G118829CD1351123	LAB/PP/25	☒
7.	MULTIMETER	GOSSEN METRAWATT/ METRA HIT ENERGY	UF0593	LAB/PP/18	☒
8.	DATA ACQUISITION	KEYSIGHT/ 34972A	MY57003984	LAB/PP/23	☒
9.	THERMAL IMAGING CAMERA	FLIR/ E50	49037600	LAB/UP/05	☒
10.	DRAUGH-PROOF CHAMBER	LUG/ -	-	LAB/UP/21	☒
11.	LABORATORY FREEZER	LIEBHERR/ K 561732	7084 679-01	LAB/UP/20	☐
12.	COOLING INCUBATOR	BINDER/ KB 720 E6	201700000016392	LAB/UP/25	☒
13.	THERMAL CHAMBER	WAMED/ KBC-65GP	311/KBC65GPO82008	LAB/UP/24	☐
14.	AC PROGRAMMABLE POWER	ITECH/ IT7322	602130010726850004	LAB/UP/36	☐
MECHANICAL STRENGTH					
15.	BALANCE	RADWAG/ WLC30/C1/R	226036/08	LAB/PP/07	☐
16.	DYNAMOMETER	TOHNICHI/ 0,7-7Nm	319859Y	LAB/PP/13	☐
17.	DYNAMOMETER	TOHNICHI/ 5-50Nm	331663E	LAB/PP/12	☐
18.	SPRING HAMMER	LISUN GROUP/ IK02	T201707001	LAB/UP/30	☐
19.	SPRING HAMMER	LISUN GROUP/ IK03	T201707002	LAB/UP/31	☐
20.	SPRING HAMMER	LISUN GROUP/ IK04	T201707003	LAB/UP/32	☐
21.	SPRING HAMMER	LISUN GROUP/ IK05	T201707004	LAB/UP/33	☐
22.	SPRING HAMMER	LISUN GROUP/ IK06	T201707005	LAB/UP/34	☐
23.	PENDULUM HAMMER IK07-10	LUG/ IK07-10+	-	LAB/UP/35	☒
FLAMMABLE MATERIALS					
24.	GWT TESTER	LISUN GROUP/ ZRS-3HS	T201509001	LAB/PP/24	☐
25.	BALL PRESSURE TEST DEVICE	LISUN GROUP/ ZBP-T	T201407004	LAB/UP/14	☐
ELECTRICAL TESTS					
26.	ELECTRICAL SAFETY TESTER	GW INSTEK/ GPT-9804	GEQ120173	LAB/PP/20	☒
27.	LEAKAGE CURRENT TESTER	GW INSTEK/ GLC-9000	GER835099	LAB/PP/21	☒
28.	POWER QUALITY ANALYZER	A-EBERLE/ PQ-BOX 150 STD	1726-001	LAB/PP/19	☒
29.	AC VOLTAGE STABILIZER	ZAL MED/ ESN-2000	07/100/09	LAB/UP/06	☒
RESISTANCE TO DUST , SOLID OBJECTS AND MOISTURE					
30.	TEST FINGER	LISUN GROUP/ SMT-1	T201407005	LAB/UP/15	☐
31.	STANDARD TEST WIRE	LISUN GROUP/ IP3X	T201707007	LAB/UP/16	☐
32.	STANDARD TEST WIRE	LISUN GROUP/ IP4X	T201707008	LAB/UP/17	☐
33.	DUST CHAMBER	ITS/ SK2000-10	01419-01	LAB/UP/29	☒
34.	IP TEST EQUIPMENT IPX5/6	LISUN GROUP/ JL-56	T201401004-2	LAB/UP/18	☒
35.	IP TEST EQUIPMENT IPX3/4	LISUN GROUP/ JL-34	T201401004-1	LAB/UP/19	☐

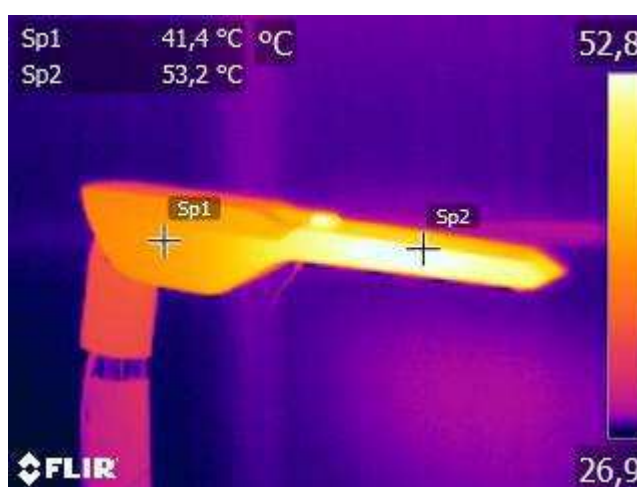
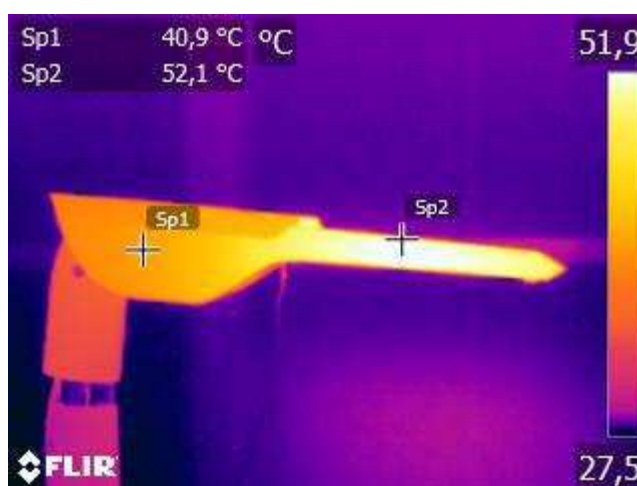
ANNEX 6: DETAILS IMAGES (PHOTOS)










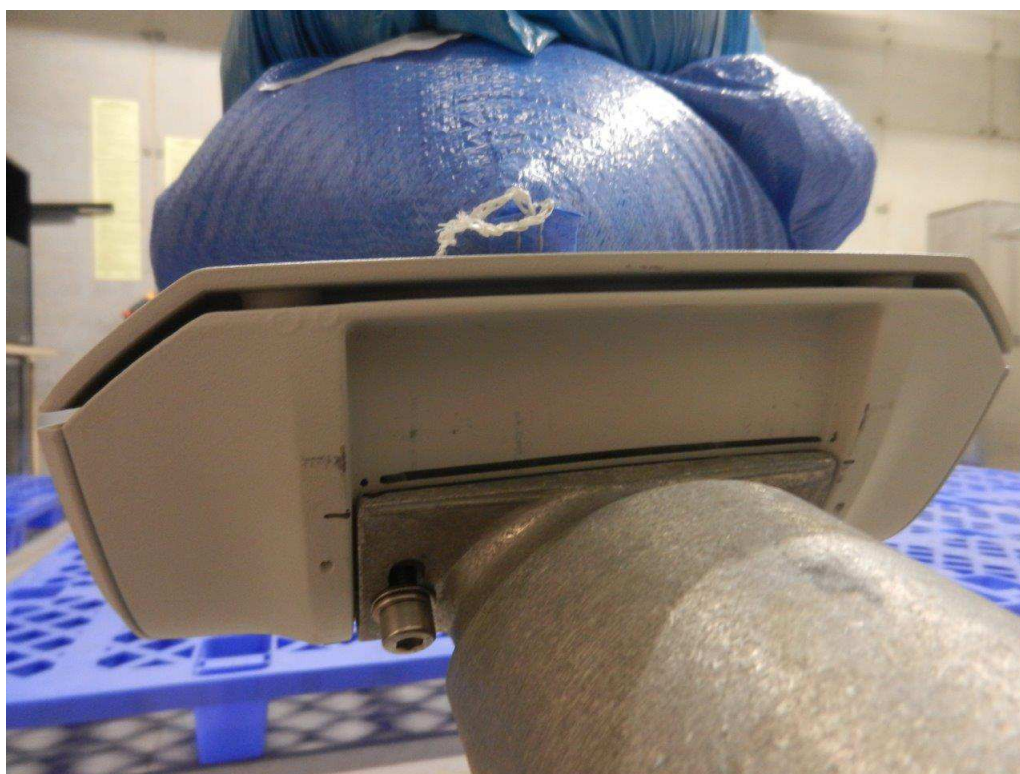


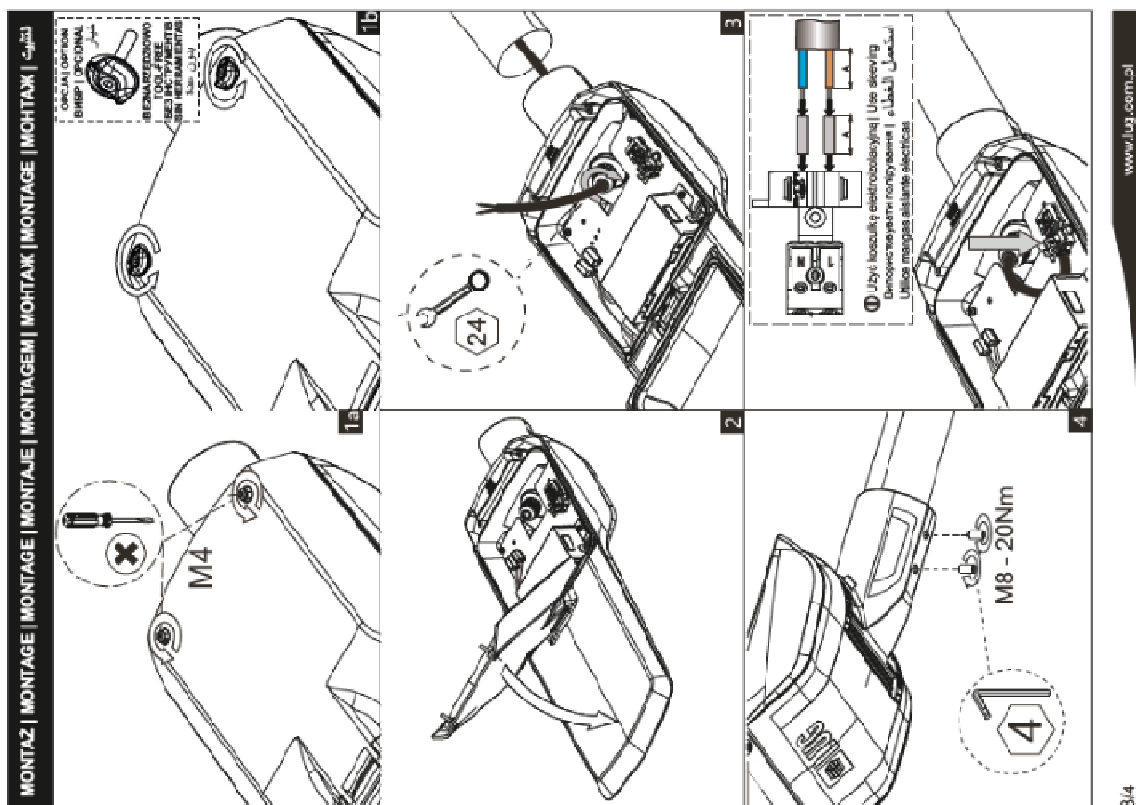
F – 06e/POL - 1

Nr wydania: 03

Data wydania: 31.10.2018

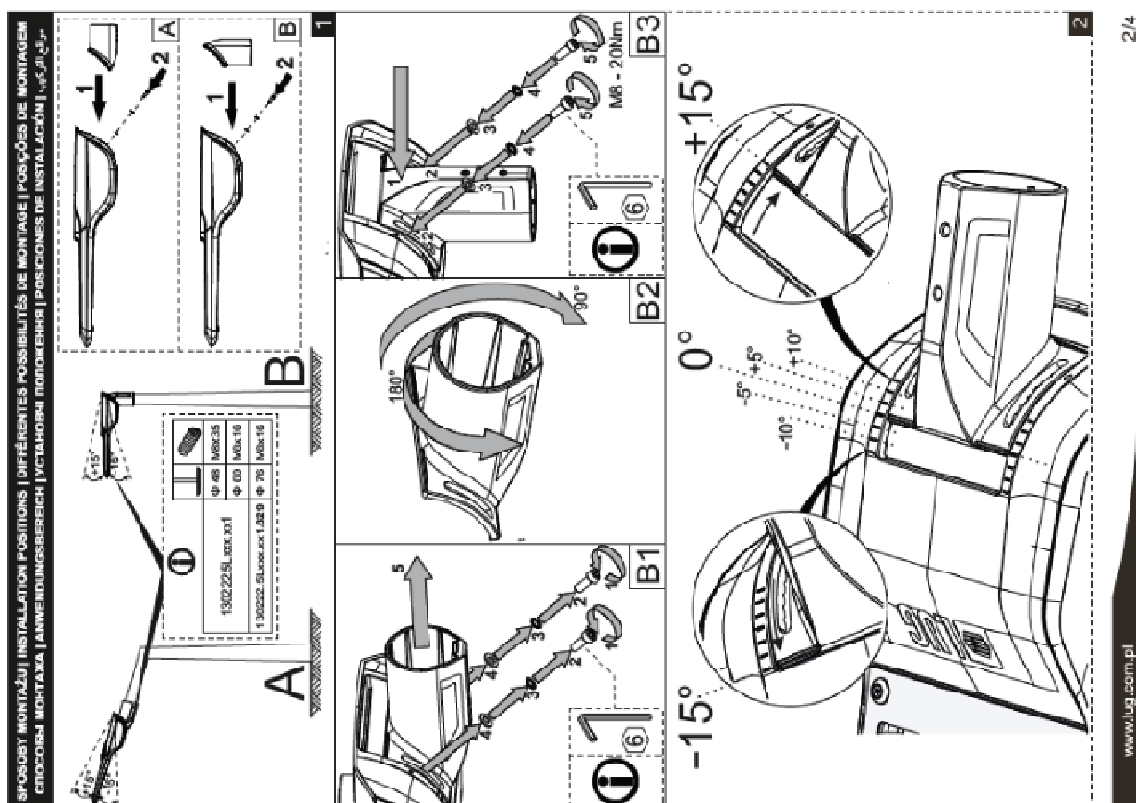
Strona 39 / 43





3/4

www.lug.com.pl



www.lug.com.pl

2/4