CENTER FOR TESTING AND EUROPEAN CERTIFICATION LTD
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LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
Certificate of accreditation № 101 ЛИ / 22.11.2019, valid until: 26.11.2022
Issued by EA BAS, in accordance with the requirements of BDS EN ISO/IEC 17025:2018

ИА "БСА" Рег.№ 101 ЛИ ЛАБОРАТОРИЯ ЗА ИЗПИТВАНЕ

TEST REPORT

№ 2emc-21-623/28.09.2021

OBJECT TO BE TESTED: Electric and electronic equipment, appliances, devices. Luminaries.
Lighting fixture, Item: LED Glow Economy 40W 120lm/W D66 External 4000K
Model representative of serie: LED Glow Economy (see page 2)
(name of obejct to be tested , type, model, quantity, type and other)

APPLICANT FOR TEST: "Electrostart" JSCo. 3540 Varshets, 2 Republika Blvd.,
Tel.: +359 2 400 7011, fax: + 359 2 400 7012;
Application № 623/ 28.07.2021
(name of the firm – applicant, address, telephone, number and date of the test application)

METHOD OF TEST :
BDS EN IEC 55015:2019 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.
BDS EN IEC 61000-3-2:2019 Electromagnetic compatibility (EMC).
Part 3-2: Limits – Limits for harmonic current emissions (equipment input current <= 16 A per phase).
BDS EN 61000-3-3:2013+A1:2019 Electromagnetic compatibility (EMC).
Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
BDS EN 61547:2010 Equipment for general lighting purposes - EMC immunity requirements
BDS EN 61000-4-2:2009 Electromagnetic compatibility (EMC).
Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
BDS EN 61000-4-8:2010 Electromagnetic compatibility (EMC).
Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
BDS EN IEC 61000-4-11:2020 Electromagnetic compatibility (EMC).
Part 4-11: Testing and measurement techniques–Voltage dips,short interruptions and voltage variations immunity tests
(number and name of the standards)

DATE OF ACCEPTANCE IN THE TEST LABORATORY: 28.07.2021

CODE OF THE OBJECT: 1 piece, ref.№ 981240120042158, year of production 2021

MANUFACTURER: "Electrostart" JSCo. 3540 Varshets, 2 Republika Blvd.,
Tel.: +359 2 400 7011, fax: + 359 2 400 7012
(firm, trade mark, address)

DECLARED TECHNICAL DATA: Rated voltage – 220-240 V AC
Rated frequency – 50/60 Hz
Rated power – 40 W
Class II

ELECTRONIC CONTROLGEAR: 40W LED Driver 1000 mA, ref.№ 170200000000112 Electrostart

DATE OF TEST PERFORMANCE: 28.07.2021 – 28.09.2021

THE HEAD OF LABORATORY: .....
/ T. Hristov /

Serie: LED Glow Economy	
LED Glow Economy 36W D66 100lm/W 3000K	LED Glow Economy 36W D312 100lm/W 3000K
LED Glow Economy 36W D66 100lm/W 4000K	LED Glow Economy 36W D312 100lm/W 4000K
LED Glow Economy 36W D66 100lm/W 6500K	LED Glow Economy 36W D312 100lm/W 6500K
LED Glow Economy 36W D66 120lm/W 3000K	LED Glow Economy 36W D312 120lm/W 3000K
LED Glow Economy 36W D66 120lm/W 4000K	LED Glow Economy 36W D312 120lm/W 4000K
LED Glow Economy 36W D66 120lm/W 6500K	LED Glow Economy 36W D312 120lm/W 6500K
LED Glow Economy 40W D66 100lm/W 3000K	LED Glow Economy 40W D312 100lm/W 3000K
LED Glow Economy 40W D66 100lm/W 4000K	LED Glow Economy 40W D312 100lm/W 4000K
LED Glow Economy 40W D66 100lm/W 6500K	LED Glow Economy 40W D312 100lm/W 6500K
LED Glow Economy 40W D66 120lm/W 3000K	LED Glow Economy 40W D312 120lm/W 3000K
LED Glow Economy 40W D66 120lm/W 4000K	LED Glow Economy 40W D312 120lm/W 4000K
LED Glow Economy 40W D66 120lm/W 6500K	LED Glow Economy 40W D312 120lm/W 6500K
LED Glow Economy 36W 100lm/W D66 UGR 3000K	LED Glow Economy 36W D312 100lm/W UGR 3000K
LED Glow Economy 36W 100lm/W D66 UGR 4000K	LED Glow Economy 36W D312 100lm/W UGR 4000K
LED Glow Economy 36W 100lm/W D66 UGR 6500K	LED Glow Economy 36W D312 100lm/W UGR 6500K
LED Glow Economy 40W 120lm/W D66 UGR 3000K	LED Glow Economy 36W D312 120lm/W UGR 3000K
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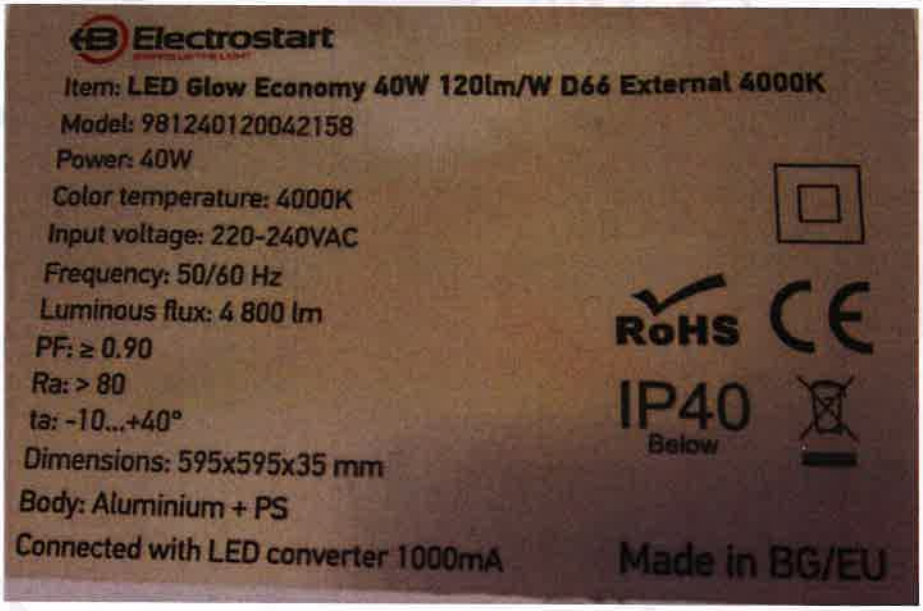
	LED Glow Economy 40W D312 100lm/W UGR 6500K
	LED Glow Economy 40W D312 120lm/W UGR 3000K
	LED Glow Economy 40W D312 120lm/W UGR 4000K
	LED Glow Economy 40W D312 120lm/W UGR 6500K

Copy of identification table and/or photo of tested object



LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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I. Emission of Radio disturbance characteristics of electrical lighting and similar equipment

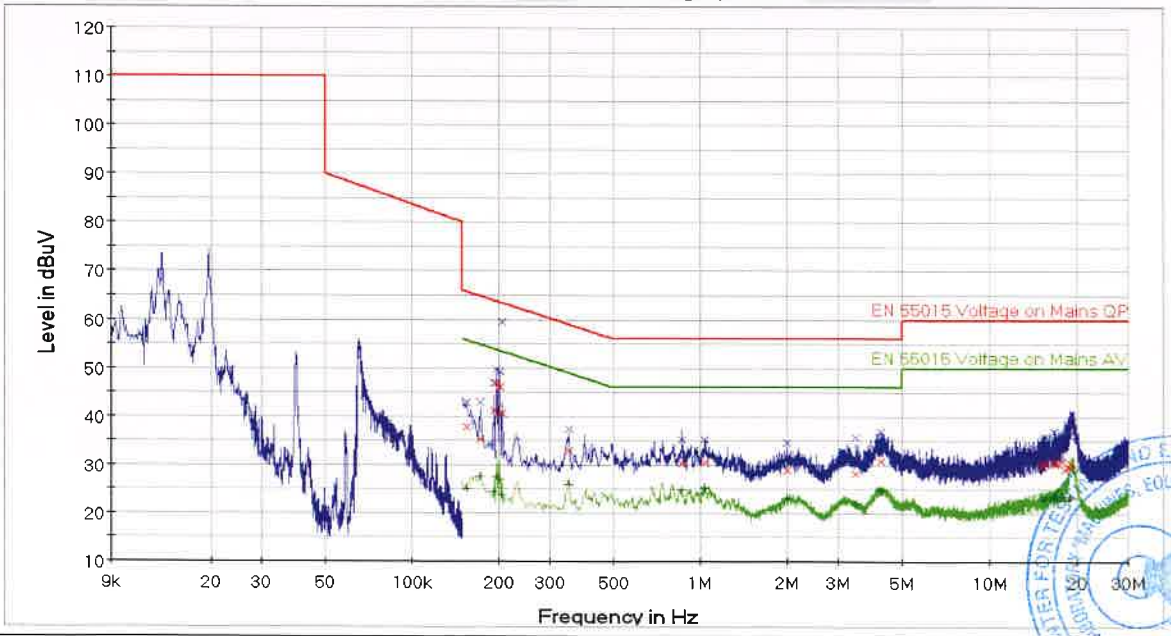
1. Mains terminal disturbance voltage – 9kHz ÷ 30MHz

BDS EN 55015, cl. 4.3 – Disturbance voltage limits at mains terminals – Table 1
BDS EN 55015, cl. 5.3.2.1 – Application of the limits
BDS EN 55015, cl. 7 – Operating conditions for lighting equipment
BDS EN 55015, cl. 7.6 – Ambient temperature: 24 °C; Relative Humidity: 40 %.
BDS EN 55015, cl.8.3 – Measurement of disturbance voltages, at the mains terminals of luminaires
The test is performed at supply voltage: 230 V
Measurement uncertainty: 2,75 dB(μV)

RESULTS OF MEASUREMENT :

Frequency	Terminal disturbance voltages, mains line – N					
	Quasi peak - QP			Average - AV		
	Measuring	Margin	Limit	Measuring	Margin	Limit
MHz	**dB(μV)**	**dB(μV)**	**dB(μV)**	**dB(μV)**	**dB(μV)**	**dB(μV)**
0,15450	37,9	27,8	65,8	25,2	30,6	55,8
0,17250	35,2	29,6	64,8	27,7	27,1	54,8
0,19275	41,2	22,7	63,9	24,5	29,4	53,9
0,19725	46,9	16,9	63,7	27,6	26,1	53,7
0,20175	46,2	17,4	63,5	27,1	26,4	53,5
0,20625	40,6	22,8	63,4	23,9	29,5	53,4
0,34800	33,0	26,0	59,0	26,0	23,0	49,0
0,86100	30,3	25,7	56,0	24,9	21,1	46,0
1,03875	30,6	25,4	56,0	25,2	20,8	46,0
1,99050	28,9	27,1	56,0	23,2	22,8	46,0
3,45975	28,3	27,7	56,0	21,9	24,1	46,0
4,23600	30,9	25,1	56,0	24,8	21,2	46,0
15,26550	29,8	30,2	60,0	22,9	27,1	50,0
15,51975	30,4	29,6	60,0	23,4	26,6	50,0
16,72575	30,8	29,2	60,0	23,7	26,3	50,0
16,95750	30,1	29,9	60,0	23,2	26,8	50,0
17,87100	30,8	29,2	60,0	23,7	26,3	50,0
18,24000	29,2	30,8	60,0	22,7	27,3	50,0
18,76650	29,6	30,4	60,0	23,0	27,0	50,0
19,09275	30,3	29,7	60,0	23,4	26,6	50,0

Drawing of terminal disturbance voltages, mains line – N



LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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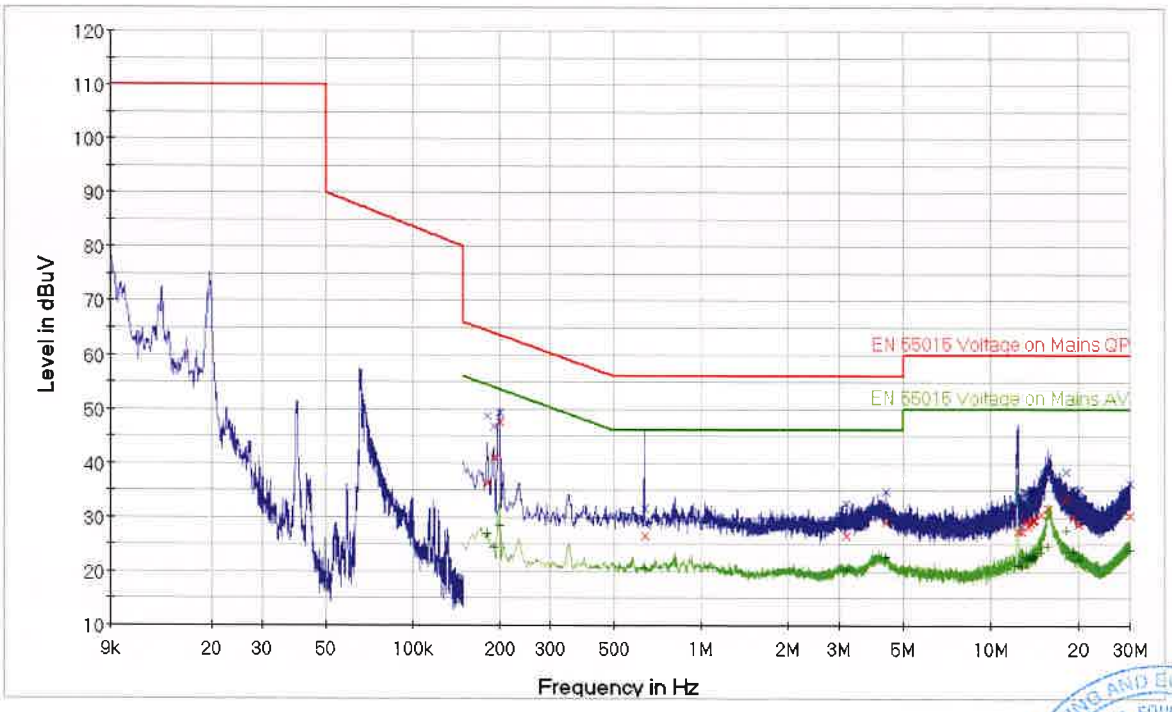
Frequency	Terminal disturbance voltages, mains line - L					
	Quasi peak - QP			Average - AV		
	Measuring	Margin	Limit	Measuring	Margin	Limit
MHz	dB(μV)	dB(μV)	dB(μV)	dB(μV)	dB(μV)	dB(μV)
0,18150	36,3	28,1	64,4	27,1	27,3	54,4
0,19050	41,0	23,0	64,0	24,3	29,7	54,0
0,19950	47,6	16,0	63,6	28,4	25,2	53,6
0,63600	26,5	29,5	56,0	20,5	25,5	46,0
3,16500	26,6	29,4	56,0	20,5	25,5	46,0
4,35975	29,1	26,9	56,0	22,8	23,2	46,0
12,46650	27,5	32,5	60,0	21,3	28,7	50,0
12,79725	27,5	32,5	60,0	21,0	29,0	50,0
13,31925	29,2	30,8	60,0	22,7	27,3	50,0
13,61400	28,3	31,7	60,0	22,0	28,0	50,0
13,76700	28,9	31,1	60,0	22,3	27,7	50,0
14,02575	29,4	30,6	60,0	22,9	27,1	50,0
14,08425	29,4	30,6	60,0	22,7	27,3	50,0
14,22825	29,4	30,6	60,0	22,6	27,4	50,0
14,97075	30,5	29,5	60,0	23,7	26,3	50,0
15,84375	31,7	28,3	60,0	24,6	25,4	50,0
18,29850	33,4	26,6	60,0	27,6	22,4	50,0
19,30650	30,0	30,0	60,0	23,8	26,2	50,0
20,15475	28,6	31,4	60,0	22,4	27,6	50,0
29,99175	30,5	29,5	60,0	24,1	25,9	50,0

Drawing of terminal disturbance voltages, mains line – L



LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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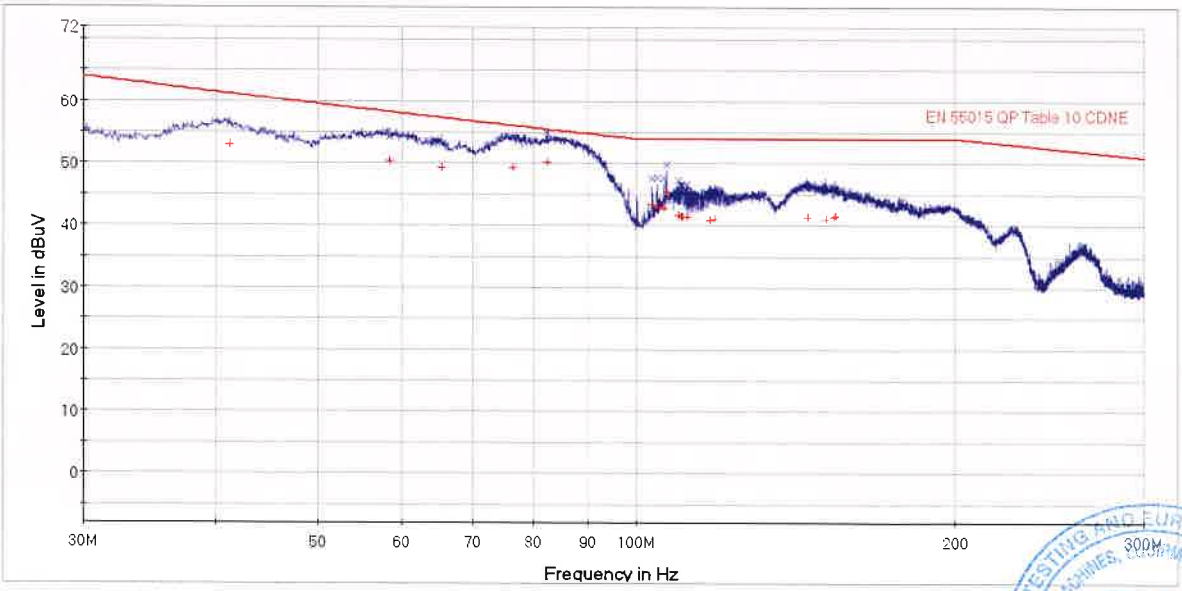
2. Radiated electromagnetic disturbances – 30MHz ÷ 300MHz
BDS EN 55015, cl. 4.5.3 –Limits - Table 10 – CDNE method
BDS EN 55015, cl. 5.3.4.2 – Application of the limits
BDS EN 55015, cl. 7 – Operating conditions for lighting equipment
BDS EN 55015, cl. 7.6 – Ambient temperature: 24 °C ; Relative Humidity: 40 %.
The test is performed at supply voltage: 230 V
Measurement uncertainty: 3,05 dB(μV)

RESULTS OF MEASUREMENT **:**

Frequency	**Radiated electromagnetic disturbances**		
	Quasi peak - QP		
	Measuring	**Margin**	**Measuring**
MHz	**dB(μV)**	**dB(μV)**	**dB(μV)**
41,160	52,9	8,3	61,2
58,380	50,4	7,8	58,3
65,400	49,3	8,1	57,3
76,380	49,3	6,8	56,1
82,380	50,3	5,2	55,5
103,440	43,4	10,6	54,0
104,580	43,1	10,9	54,0
106,200	42,8	11,2	54,0
106,800	45,4	8,6	54,0
109,620	41,7	12,3	54,0
110,280	41,5	12,5	54,0
110,400	41,4	12,6	54,0
111,600	41,4	12,6	54,0
117,300	40,9	13,2	54,0
118,440	41,0	13,0	54,0
118,560	41,0	13,0	54,0
144,840	41,2	12,8	54,0
150,660	41,0	13,0	54,0
153,420	41,3	12,7	54,0
153,900	41,5	12,5	54,0

Drawing of Radiated electromagnetic disturbances



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2. HARMONIC CURRENT MEASUREMENT

Classification of equipment - C

Duration of test - 5 min; Measurement uncertainty: ±7,1%

V_{RMS}= 230,5 V	I_{peak}= 0,264 A	F = 50,000 Hz
I_{RMS}= 0,172 A	S = 39,62 VA	P = 38,46 W
Crest Factor= 1,537	Power Factor = 0,971	THDi = 12,3 %

Harmonic	AVERAGE VALUES			MAX VALUE		
	Measured	100% Limit	% of Limit	Measured	150% Limit	% of Limit
№	, A	, A	%	, A	, A	%
2	0,0000	0,0035	0,0	0,0001	0,0053	1,9
3	0,0175	0,0506	34,6	0,0177	0,0759	23,3
5	0,0083	0,0174	47,7	0,0085	0,0261	32,6
7	0,0051	0,0121	42,1	0,0052	0,0182	28,7
9	0,0000	0,0087	0,0	0,0036	0,0131	27,6
11	0,0000	0,0052	0,0	0,0025	0,0078	32,1
13	0,0000	0,0052	0,0	0,0017	0,0078	21,8
15	0,0000	0,0052	0,0	0,0013	0,0078	16,7
17	0,0000	0,0052	0,0	0,0010	0,0078	12,8
19	0,0000	0,0052	0,0	0,0010	0,0078	12,8
21	0,0000	0,0052	0,0	0,0011	0,0078	14,1
23	0,0000	0,0052	0,0	0,0010	0,0078	12,8
25	0,0000	0,0052	0,0	0,0009	0,0078	11,5
27	0,0000	0,0052	0,0	0,0007	0,0078	9,0
29	0,0000	0,0052	0,0	0,0006	0,0078	7,7
31	0,0000	0,0052	0,0	0,0005	0,0078	6,4
33	0,0000	0,0052	0,0	0,0005	0,0078	6,4
35	0,0000	0,0052	0,0	0,0004	0,0078	5,1
37	0,0000	0,0052	0,0	0,0005	0,0078	6,4
39	0,0000	0,0052	0,0	0,0006	0,0078	7,7

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Harmonics of power supply source

Harmonic	Measured	100% Limit	% of Limit
№	V	V	%
2	0,123	0,461	26,6
3	0,025	2,074	1,2
4	0,025	0,461	5,3
5	0,000	0,922	0,0
6	0,000	0,461	0,0
7	0,000	0,691	0,0
8	0,000	0,461	0,0
9	0,000	0,461	0,0
10	0,000	0,461	0,0
11	0,000	0,230	0,0
12	0,000	0,230	0,0
13	0,000	0,230	0,0
14	0,000	0,230	0,0
15	0,000	0,230	0,0
16	0,000	0,230	0,0
17	0,000	0,230	0,0
18	0,000	0,230	0,0
19	0,000	0,230	0,0
20	0,000	0,230	0,0
21	0,000	0,230	0,0
22	0,000	0,230	0,0
23	0,000	0,230	0,0
24	0,000	0,230	0,0
25	0,000	0,230	0,0
26	0,000	0,230	0,0
27	0,000	0,230	0,0
28	0,000	0,230	0,0
29	0,000	0,230	0,0
30	0,000	0,230	0,0
31	0,000	0,230	0,0
32	0,000	0,230	0,0
33	0,000	0,230	0,0
34	0,000	0,230	0,0
35	0,000	0,230	0,0
36	0,000	0,230	0,0
37	0,000	0,230	0,0
38	0,000	0,230	0,0
39	0,000	0,230	0,0
40	0,000	0,230	0,0

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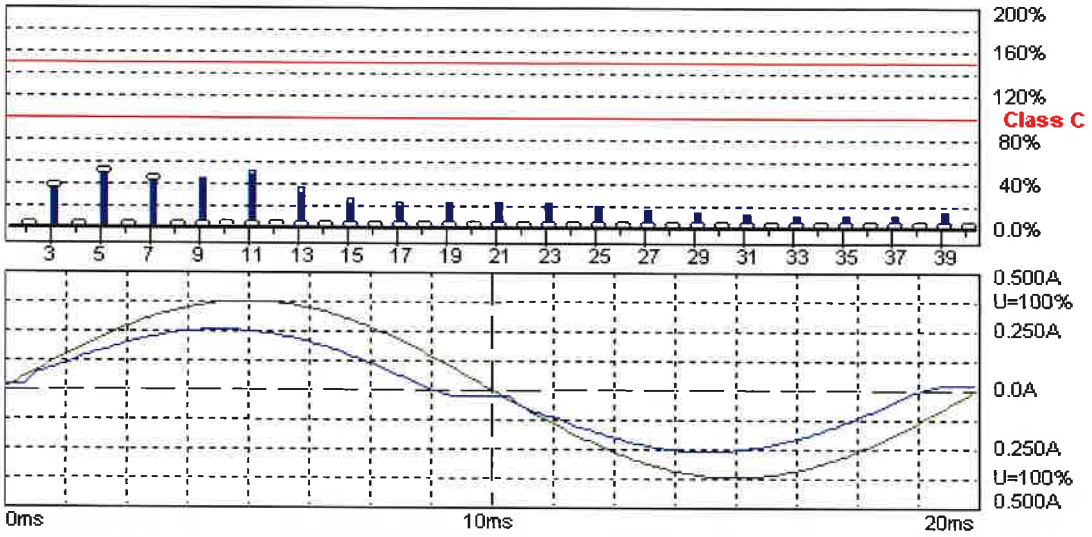
Current and voltage waveform



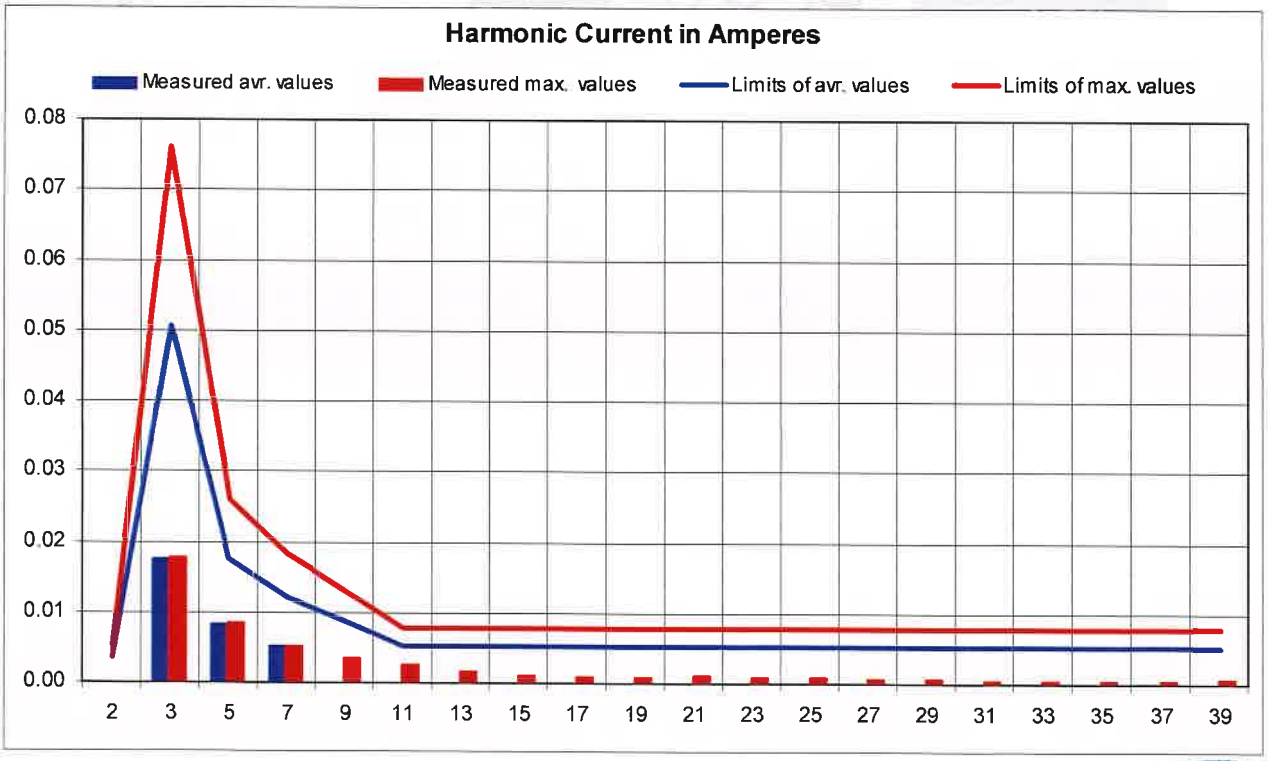
Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2) 16/08/2021 13:10:30

Urms =	230.5	V	P =	38.46	W	THC =	0.021	A	Range: 0.5 A
Irms =	0.172	A	pf =	0.971		H1max =	0.174	A	V-nom: 229 V
									TestTime: 5 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Graphics harmonics



3. Voltage fluctuations and flicker measurement

EN 61000-3-3, cl. 4 – Assesment of voltage changes, voltage fluctuations and flicker

EN 61000-3-3, cl. 5 – Limits

EN 61000-3-3, cl. 6 – Test conditions

EN 61000-3-3, cl. 6.5 - Observation period

According to BDS EN 61000-3-3:2013+A1:2019 – Annex A, clause A.2

LED luminaires with ratings less than or equal to 200 W, are deemed to comply of limits in this standard and are not required to be tested

II. Immunity of Radio disturbance characteristics for general lighting purposes

BDS EN 61547 cl. 4.2 – Performance criteria for lighting equipment

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

Performance criterion B
During the test, the Iuminous intensity may change to any value. After the test, the Iuminous intensity shall be restored 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 mains 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.

Environment requirements during the test	Ambient temperature	15 to 35 °C
	Relative Humidity	30 to 60 %
	Air pressure	860 to 1060 mbar
Test environment	Ambient temperature	24 °C
	Relative Humidity	40 %
	Air pressure	1010 mbar

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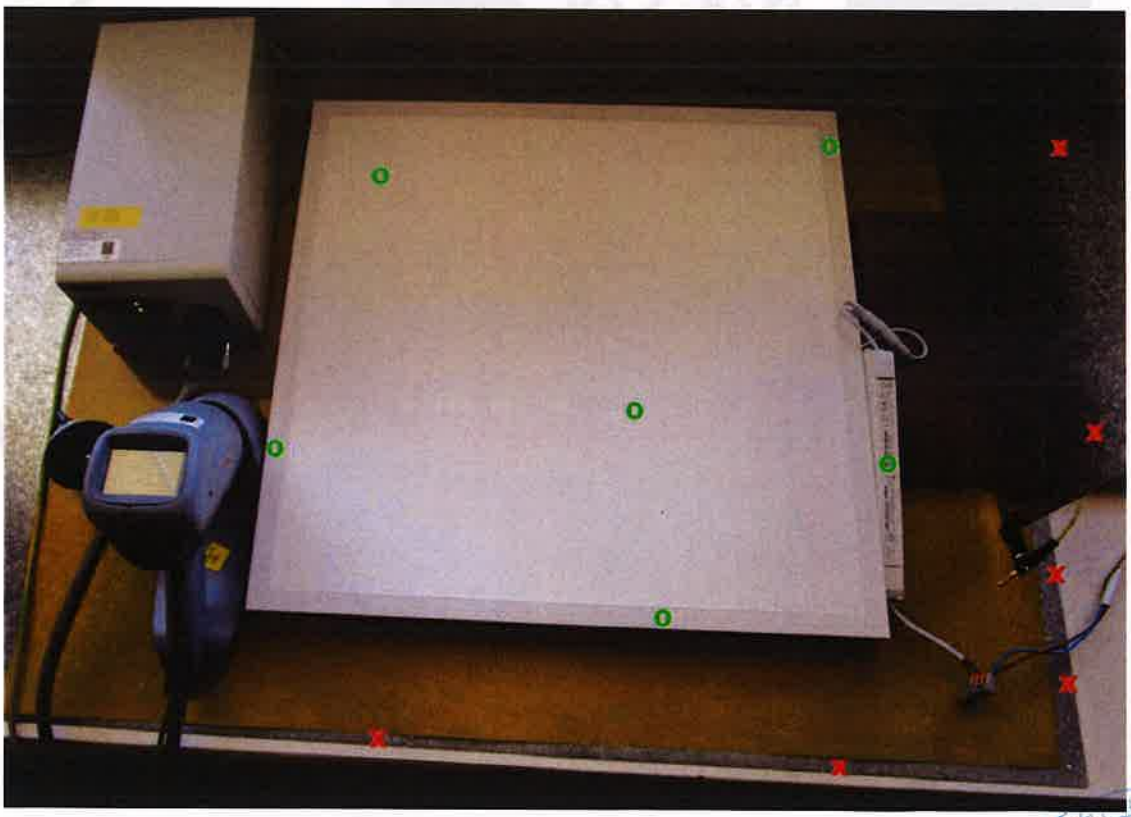
1. IMMUNITY TO ELECTROSTATIC DISCHARGE (ESD)

BDS EN 61547, т. 5.2 – Electrostatic discharges – Table 1 - Test levels at enclosure port
BDS EN 61000-4-2, т. 7 – Test setup
BDS EN 61000-4-2, т. 7.2.2 – Table-top equipment , Figure 4
BDS EN 61000-4-2, т. 8 – Test procedure
Measurement uncertainty: Tolerance of output voltage: ±5% ; Tolerance of the first peak of discharge current: ± 15%
Deviation of current rise time: ±25% (0,6ns – 1ns); Current deviation measured at 30ns : ±30%
Current deviation measured at 60ns : ±30%

Time interval between discharges	1 s
Discharge impedance	150 pF
Discharge impedance	330 Ω
Performance Criteria according to cl.6.3.4 and Table 15 of BDS EN 61547	Criteria B
Number of discharges	10 positive and 10 negative at the selected points

Discharge location	Type of discharge	Level	Test voltage	Polarity	Result
Body of luminaire - O	Air - Direct	1;2;3	2;4;8 kV	+ / -	Criteria A
Vertical coupling plane (VCP) - X	Contact - Indirect	1;2	2;4 kV	+ / -	Criteria A
Horizontal coupling plane (HCP) - X	Contact - Indirect	1;2	2;4 kV	+ / -	Criteria A

Picture of the object with marked points of discharge locations



The results showed in present test report concern tested sample only
The test report could be reproduced as a whole only and after written permission of the laboratory

2. RATED POWER FRECUENCY MAGNETIC FIELD

BDS EN 61547, т. 5.4 – Applicability ,Table 3

BDS EN 61000-4-8 т. 7 – Test setup

BDS EN 61000-4-8 т. 8 – Test procedure

Measurement uncertainty: Value of output current : ≤ 1%

Performance Criteria according to cl.6.3.4 and Table 15 of BDS EN 61547	Criteria A

Standard inductive coil	Orientation of standard inductive coil	Level	Field strength in the centre for all other inductive coils	Current in the coil (a coil with 10 windings)	Result
1 m x 1 m	X	2	3 A/m	3,45 A	Criteria A
1 m x 1 m	Y	2	3 A/m	3,45 A	Criteria A
1 m x 1 m	Z	2	3 A/m	3,45 A	Criteria A

3. Voltage dips, short interruptions and voltage variations immunity tests

3.1 Voltage dips immunity tests

BDS EN 61547, т. 5.8 – Applicability ,Table 11

BDS EN IEC 61000-4-11 т. 7 – Test setup

BDS EN IEC 61000-4-11 т. 8 – Test procedure

BDS EN IEC 61000-4-11 т. 8.2.1 – Testing for each selected combination of test level and duration with a sequence of three dips with intervals of 10 s minimum (between each test event)

Measurement uncertainty: Deviation of output voltage : ±5%

Performance Criteria according to cl.6.3.4 and Table 15 of BDS EN 61547	Criteria C

Voltage test levels (% of rated voltage)	Duration (cycles)	Phase angle synchronization	Result
70 %	10 cycles	0°	Criteria A

3.2 Short interruptions immunity tests

BDS EN 61547, т. 5.8 – Applicability ,Table 12

BDS EN IEC 61000-4-11 т. 7 – Test setup

BDS EN IEC 61000-4-11 т. 8 – Test procedure

BDS EN IEC 61000-4-11 т. 8.2.1 – Testing for each selected combination of test level and duration with a sequence of three interruptions with intervals of 10 s minimum (between each test event)

Measurement uncertainty: Deviation of output voltage : ±5%

Performance Criteria according to cl.6.3.4 and Table 15 of BDS EN 61547	Criteria B

Voltage test levels (% of rated voltage)	Duration (cycles)	Phase angle synchronization	Result
0 %	0,5 cycles	0°	Criteria A

LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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USED TECHNICAL EQUIPMENTS:

	Appliance	Type	Manufacturer	Identity №	Last calibration date
1.	EMI – receiver 9 kHz ÷ 3600 MHz	ESRP3	Rohde & Schwarz	1316.4500K03-102168-uT	15.01.2020
2.	Line impedance stabilisation networks	NNB 52	TESEQ Switzerland	26326	10.09.2020
3.	Coupling/Decoupling network	CDN M2+M3	Frankonia EMC Test - Systems	A2210229	10.09.2020
4.	System for measuring of harmonic current and flicker	HAR1000	EMC PARTNER	HAR1000-1P 230V-0253	07.02.2020
5.	ESD - Generator	NSG438	TESEQ Switzerland	988	19.05.2021
6.	System for measuring voltage interruptions and dips, fast transients/burst and surge	IMU4000	EMC PARTNER	106754-2150	11.02.2020
7.	Digital multimeter	UNIGOR 390	LEM Austria	PI 3288	20.03.2020
8.	Power Quality Analyzer	435	Fluke Netherlands	DM 9881064	20.10.2020
9.	Thermometer-higrometer	177-H1	TESTO Germany	01320300/902	29.04.2021

TEST PERFORMER: 1. .....
/ D. Chavalinov /

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2. .....
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