PHOTOMETRIC TEST REPORT

LM-79 & EN 13032-4

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Location: Moldova

Nr.TSP-17025-LB-001.00

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 13032-4:2015 IES LM-79-08
Test Report No. BF_13_5375_18	Tested by: Krzysztof Olek	Compiled by: Krzysztof Olek
Test date: 2018-02-17	Approved by: Marcin Białas	Client name: A. Pomałecki LUG Light Factory
This protocol 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.		
Measurement uncertainty: The measurement uncertainty was determined in accordance with EA-4/0,2 M:2013. The uncertainty values provided are expanded uncertainties at a confidence level of approximately 95% and an extension factor of k=2.		

1. TABLE OF CONTENTS

2. LUMINAIRE DATA

Company:	LUG Light Factory
Model name:	URBINI LED ED 2450lm/740 O9 szary II klasa
Index:	130232.5L162.101
Sample No.:	056/3/18
Power supply:	Philips Xi LP 40W 0.3-1.0A S1 230V C123 sXt set to 500mA
Light source:	LUG ML1600400.W740.02A 12 LED
LED model:	CREE XPG-3 BIN: S4
Optic:	O9 PC lens
Supplementary information:	Test report is valid also for: 130232.5L041.101 URBINI LED ED 2450lm/740 O9 szary

Dimensions of luminaire:		**Dimensions of luminous area:**	
Length:	407 mm	Length:	173 mm
Width:	110 mm	Width:	71 mm
Height:	120 mm	C0-plane height:	0 mm
		C90-plane height:	0 mm
		C180-plane height:	0 mm
		C270-plane height:	0 mm

3. MEASUREMENT CONDITIONS AND STABILIZATION

Photometric method:	Photo-spectro-goniometer type C-γ, bandwith 380-750nm
Measurement type:	Absolute
Sample position during measurement:	Side, tilt 0°
Measurement distance:	10,478 ±0,002 m
Ambient temperature:	25 ±1,2°C
Integrating time:	Automatic
Burning time and stabilization criterion:	pre-stabilization time: >2h, stabilization: <0,5% during 15 min

N/A

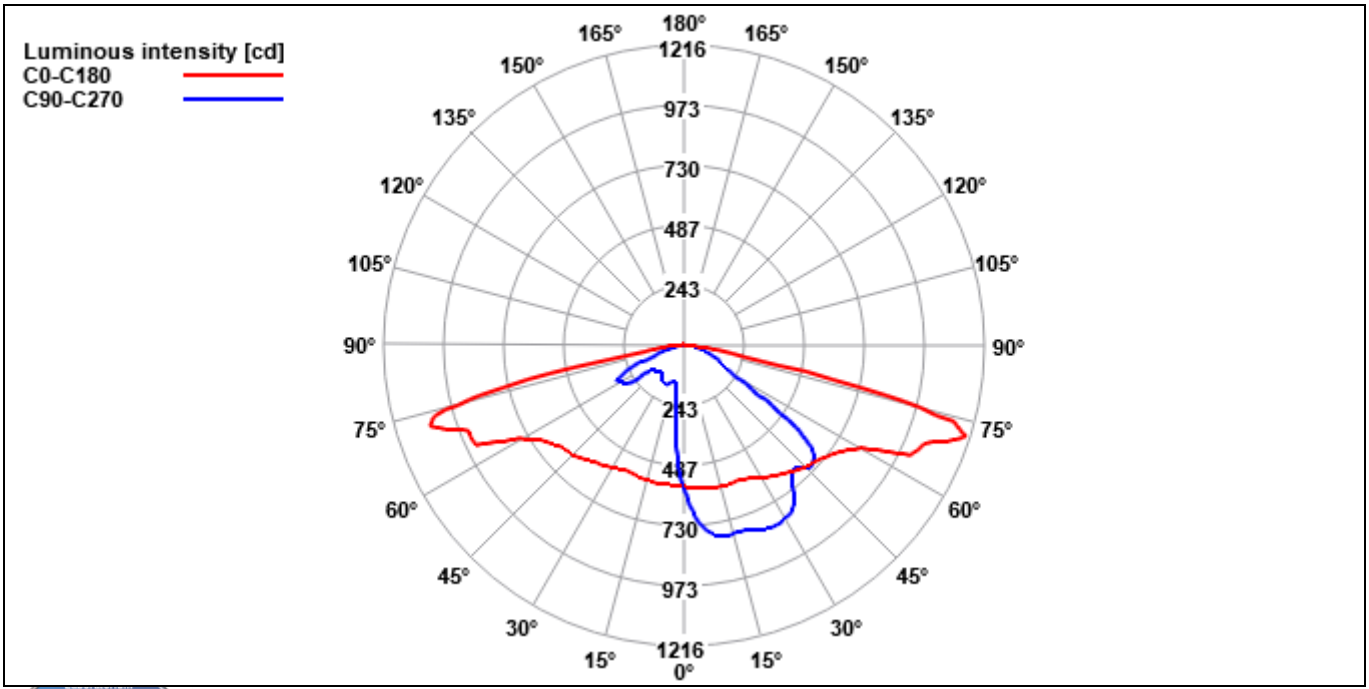
4. ELECTRICAL MEASUREMENTS RESULTS

Voltage:	230 V
Frequency:	50 Hz
Current:	0,090 A
Active power:	19,6 W
Apparent power:	N/A
Reactive power:	N/A
Power factor:	0,946
Current THD:	N/A

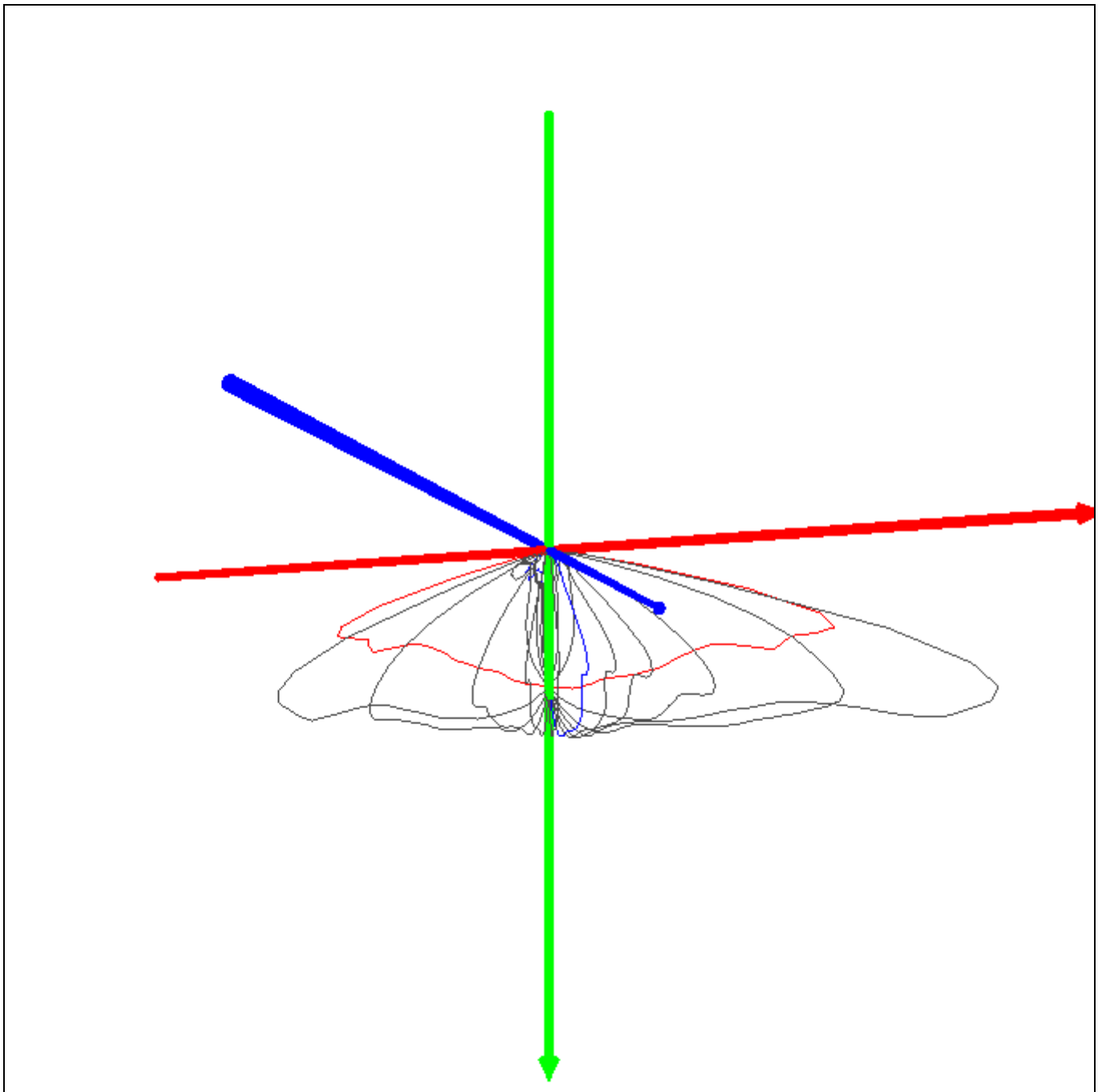
5. GONIOMETRIC MEASUREMENT RESULTS

Total luminous flux:	**2439,40 lm, relative measurement uncertainty: ±4,88%**
Light output ratio (LOR):	100,00%
Lower hemisphere output ratio (DLOR):	99,97%
Upper hemisphere output ratio (ULOR):	0,03%
Maximum luminous intensity:	1886,99 cd, relative measurement uncertainty: ±4,88%
Luminous efficacy:	124,46 lm/W
Colour temperature:	4016
Colour rendering index:	72,44
Angular Colour Uniformity:	0,0352

6. LIGHT INTENSITY DISTRIBUTION DIAGRAM



7. 3D CHART



Legend:	- C0-C180	- C90-C270	- G0-G180

8. UTILIZATION FACTORS

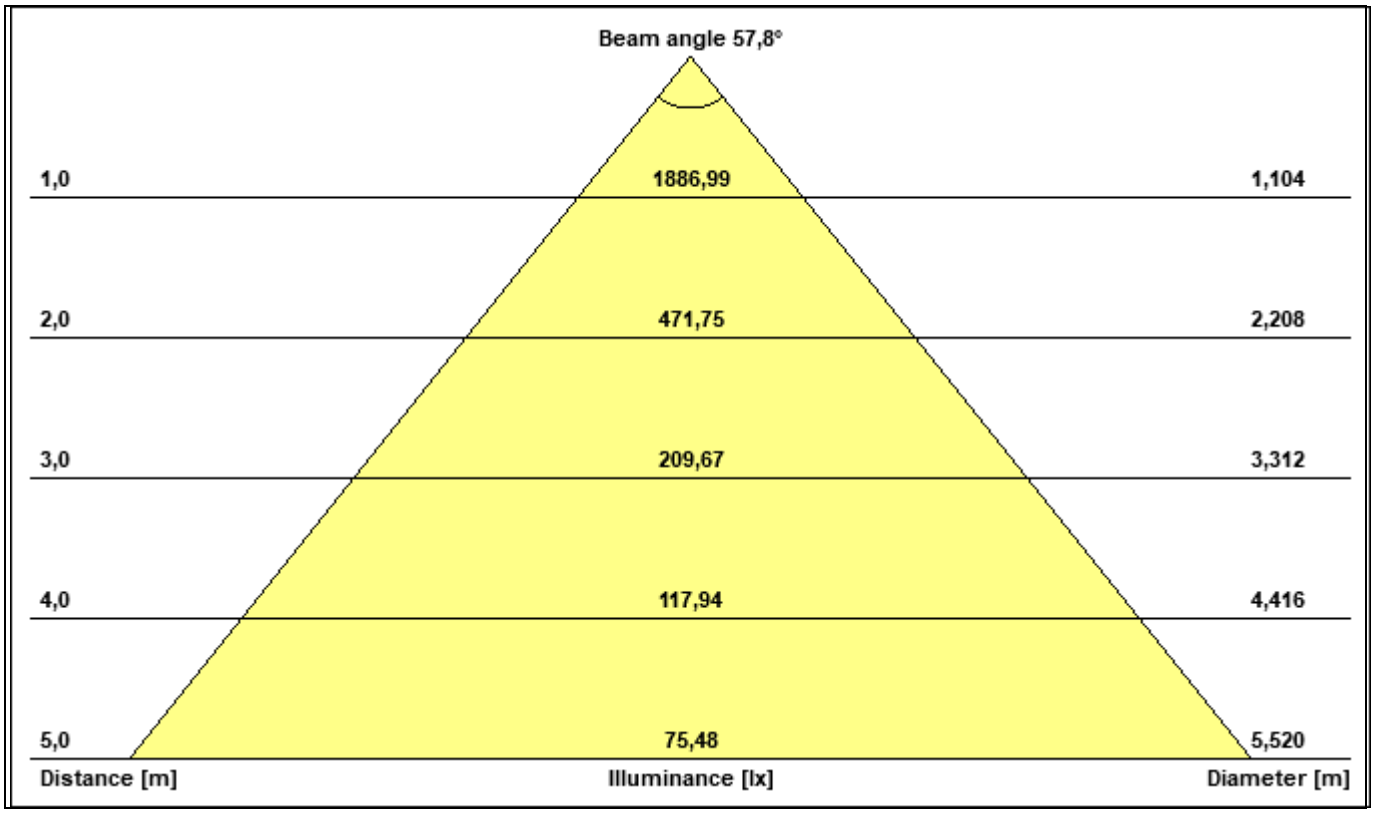
k = 0.60:	0,184	k = 2.00:	0,576
k = 0.80:	0,264	k = 2.50:	0,641
k = 1.00:	0,337	k = 3.00:	0,690
k = 1.25:	0,414	k = 4.00:	0,758
k = 1.50:	0,477	k = 5.00:	0,802

9. LUMINOUS INTENSITY [CD/KLM]

	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°
0°	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0
2°	236,8	243,9	251,9	255,3	259,5	259,2	261,5	258,9	257,5	253,4	247,8	241,3
4°	238,9	253,8	266,6	273,1	281,2	282,4	285,0	281,6	278,0	269,7	260,9	248,7
6°	239,9	261,4	280,2	291,2	298,7	300,8	302,4	299,7	294,7	285,8	272,7	256,7
8°	241,3	268,1	291,9	304,8	312,8	315,4	315,5	314,0	308,7	299,8	285,1	262,9
10°	242,9	275,3	302,3	315,9	324,1	323,8	323,2	322,3	319,5	311,1	295,3	269,8
12°	243,1	281,3	311,3	324,2	328,6	326,8	324,7	324,4	324,6	319,8	305,2	275,2
14°	243,8	286,5	318,7	326,9	326,2	326,9	326,0	325,8	326,5	325,3	313,0	281,3
16°	243,6	292,4	324,7	324,2	324,7	325,3	323,6	325,4	324,6	326,9	320,2	286,7
18°	244,5	297,6	328,0	322,2	324,1	324,5	324,9	323,8	323,1	326,0	324,2	292,1
20°	244,1	303,9	328,9	321,9	323,1	327,3	328,5	327,0	325,7	326,6	329,6	299,0
22°	243,34	310,20	328,66	322,58	325,03	330,10	331,75	330,42	327,64	327,52	331,67	305,06
24°	244,28	315,45	329,99	325,53	327,97	334,38	335,22	335,31	331,76	331,73	333,70	311,10
26°	247,71	322,23	332,99	328,26	330,45	336,52	337,71	337,54	335,18	335,86	336,98	318,20
28°	250,88	330,72	338,34	333,93	333,10	335,36	337,87	338,20	339,87	341,55	342,44	326,37
30°	255,01	338,67	345,00	338,84	333,55	332,31	334,24	335,43	342,17	348,16	349,35	332,31
32°	259,06	346,86	352,81	343,60	333,62	329,69	333,18	335,41	343,02	355,82	356,72	338,99
34°	264,28	354,18	361,36	349,19	329,14	324,47	326,65	331,70	341,42	363,42	365,12	345,87
36°	267,65	360,30	370,87	354,35	322,20	310,99	312,54	318,79	336,22	371,48	375,88	352,69
38°	271,92	367,93	383,09	355,62	310,13	292,95	295,65	300,49	324,87	375,97	388,54	361,78
40°	276,53	376,49	394,08	356,20	301,10	282,04	281,38	287,94	313,74	379,59	400,76	372,38
42°	281,62	383,51	405,09	355,51	296,34	273,04	275,16	277,66	308,70	384,60	412,59	381,49
44°	285,74	392,33	417,95	357,21	290,76	275,50	283,12	276,88	304,00	389,66	425,42	389,41
46°	289,21	400,73	432,26	356,96	296,84	291,81	294,74	295,58	304,47	392,58	440,21	398,50
48°	291,78	411,27	445,94	362,51	315,60	292,08	290,35	298,38	325,24	393,92	454,17	408,59
50°	296,06	424,26	457,00	379,03	323,20	287,77	283,24	295,30	335,22	407,11	467,81	421,62
52°	302,59	438,00	470,23	397,00	319,99	273,37	265,77	282,64	336,32	425,78	481,00	434,06
54°	308,85	450,93	488,18	410,76	307,51	246,88	232,31	260,12	327,33	439,85	499,42	447,93
56°	317,02	469,53	504,40	408,22	279,68	190,75	164,55	204,61	305,27	446,64	521,44	465,13
58°	327,35	496,58	525,95	392,50	220,19	131,25	109,99	140,24	255,51	439,02	543,04	489,27
60°	344,66	528,79	545,35	359,16	157,64	94,45	88,34	98,85	188,89	417,33	572,13	528,12
62°	377,02	578,36	567,90	308,51	108,66	82,10	77,89	84,86	133,18	368,81	609,19	586,92
64°	419,65	648,85	585,86	248,59	81,84	72,58	70,25	73,61	93,01	320,28	649,74	656,51
66°	426,95	706,03	588,25	191,19	70,03	65,56	64,86	65,31	74,92	262,06	661,14	687,30
68°	435,83	735,61	558,54	137,86	60,19	61,11	58,27	60,34	63,01	200,95	649,58	710,04
70°	469,31	767,06	515,83	96,63	53,76	52,42	47,78	53,35	53,09	141,33	614,13	737,58
72°	493,72	773,55	468,67	70,05	51,04	42,17	38,79	42,78	46,97	101,04	561,05	734,37
74°	467,95	724,16	398,41	52,50	46,23	36,70	33,50	36,32	43,49	71,26	483,86	677,78
76°	348,07	583,33	305,82	40,56	42,23	31,37	27,55	31,78	41,20	50,00	375,82	509,30
78°	161,86	286,49	198,47	32,46	37,59	25,62	23,25	27,08	38,84	35,79	239,68	216,42
80°	54,38	125,08	91,62	27,45	32,75	21,28	17,90	21,48	35,93	27,81	107,41	84,22
82°	30,07	66,79	44,80	24,99	30,45	15,62	12,89	17,15	35,77	21,74	44,47	43,75
84°	14,76	34,53	26,00	23,41	28,45	10,57	9,38	11,71	36,50	17,20	24,55	17,80
86°	5,43	9,83	15,83	14,96	25,77	6,76	4,76	7,08	27,94	11,68	11,16	4,81
88°	2,06	5,30	8,33	9,36	16,48	3,90	2,14	4,33	17,07	7,27	4,45	2,62
90°	0,36	2,76	5,41	3,20	6,95	0,96	0,14	1,24	8,13	3,15	2,55	2,15

	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
0°	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0	235,0
2°	233,9	227,1	219,3	212,3	206,7	202,2	204,2	205,0	209,0	214,7	221,2	228,2
4°	233,4	216,6	200,4	182,8	170,3	160,3	162,4	164,2	175,7	188,8	206,7	222,0
6°	233,8	206,6	177,8	147,1	124,4	110,1	108,9	115,3	133,0	157,4	188,7	215,4
8°	234,7	196,2	151,7	106,7	83,1	73,6	73,4	75,8	89,3	123,5	167,4	208,7
10°	234,6	184,7	123,8	79,0	66,8	64,2	63,2	63,5	68,8	87,4	142,9	199,8
12°	233,6	171,3	95,0	66,5	62,7	61,8	61,7	61,5	61,4	70,9	117,5	191,1
14°	232,7	156,6	77,4	62,4	62,9	63,1	61,9	62,2	60,8	62,8	92,3	181,0
16°	233,4	141,7	67,3	61,9	62,8	64,4	64,1	63,9	60,6	61,4	76,6	171,4
18°	232,3	125,7	62,3	60,6	64,4	65,7	67,1	65,9	62,0	59,1	67,4	161,0
20°	230,2	110,2	59,1	60,5	64,9	68,5	69,4	68,9	62,4	58,2	61,7	149,4
22°	229,54	94,93	58,27	60,35	66,36	70,51	71,76	70,17	64,98	58,96	58,36	136,47
24°	229,17	83,05	56,25	59,68	66,74	71,29	71,85	71,26	65,44	57,83	56,96	125,12
26°	230,17	74,03	54,05	58,52	66,18	70,47	70,91	71,23	65,20	56,59	55,07	112,55
28°	233,13	67,87	51,66	56,26	64,44	69,85	70,18	69,50	64,27	55,12	53,27	100,94
30°	235,65	63,65	50,42	54,37	61,91	66,88	67,33	66,95	61,30	53,02	51,83	93,30
32°	238,03	59,33	48,30	52,25	58,34	63,51	64,89	63,47	58,24	50,96	49,42	86,39
34°	240,97	57,14	46,85	49,70	55,45	61,55	61,30	59,96	54,32	49,07	48,18	80,00
36°	243,09	53,90	44,37	46,01	52,15	60,73	59,25	57,93	50,34	45,38	46,74	74,88
38°	245,67	51,25	43,22	42,66	48,54	59,16	58,92	56,75	47,69	43,06	44,75	69,83
40°	249,39	49,65	41,49	41,15	46,91	59,60	58,81	54,37	43,64	40,88	44,33	66,61
42°	253,82	47,82	39,74	36,93	44,59	59,10	58,59	55,36	41,85	37,88	42,37	62,97
44°	257,42	46,55	37,59	35,60	43,07	60,31	61,79	56,16	41,09	36,11	40,19	60,49
46°	260,18	45,46	35,87	33,42	42,28	62,91	63,96	57,32	40,42	33,97	39,37	57,43
48°	261,24	43,56	33,50	31,94	42,03	63,39	65,17	58,15	38,63	32,74	37,40	55,72
50°	264,59	41,56	32,43	30,70	40,73	60,92	61,88	55,39	37,61	31,12	35,00	52,98
52°	270,64	39,63	29,86	29,34	38,98	61,55	70,97	53,64	36,46	29,49	33,82	51,12
54°	276,06	37,70	28,02	28,16	38,37	99,55	111,14	73,50	34,72	28,04	31,32	48,58
56°	283,84	36,55	26,86	26,96	42,31	116,79	119,34	98,71	33,62	26,94	29,10	46,03
58°	294,87	37,25	25,59	25,77	54,12	118,76	117,29	106,93	35,39	26,41	28,00	46,06
60°	312,23	44,76	25,24	24,61	63,50	117,64	120,94	108,24	41,58	24,06	26,41	50,13
62°	342,04	47,64	23,70	23,04	66,90	123,18	126,59	109,09	47,30	22,81	25,70	57,55
64°	382,04	43,72	22,20	23,23	68,06	114,69	109,96	111,31	49,38	21,36	23,73	54,09
66°	384,64	35,89	20,03	22,81	65,36	110,59	89,46	114,07	50,82	21,03	22,57	46,68
68°	382,66	31,64	18,99	23,23	58,20	86,75	63,29	100,18	49,45	19,39	21,31	44,13
70°	411,39	28,56	20,38	23,18	53,02	68,99	36,14	82,13	48,02	19,13	21,81	42,34
72°	440,62	24,76	22,48	22,79	49,38	45,29	23,12	59,32	41,63	18,89	23,87	42,18
74°	428,78	21,67	23,98	22,94	43,79	28,68	9,52	44,48	37,13	19,63	26,60	38,49
76°	346,87	18,27	21,89	19,47	37,48	19,51	0,00	33,05	32,89	17,30	25,56	29,28
78°	184,82	14,58	18,86	17,33	28,07	12,13	0,00	22,81	26,89	16,58	21,80	20,04
80°	61,99	8,88	15,39	13,24	21,61	8,22	0,00	16,63	22,16	14,65	18,43	11,83
82°	29,05	6,33	11,26	10,48	16,33	5,08	0,00	11,63	17,26	11,83	14,03	7,66
84°	13,91	4,22	7,05	7,92	11,85	3,90	0,00	7,32	12,30	8,53	9,53	3,78
86°	6,74	2,20	4,53	5,25	8,39	2,28	0,00	4,61	9,89	6,13	5,74	2,31
88°	2,83	1,67	2,27	2,67	5,78	1,24	0,00	3,17	5,99	3,51	3,12	1,71
90°	0,28	0,59	1,69	0,31	1,86	0,00	0,00	1,16	1,51	0,24	1,40	1,16

10. BEAM CONE

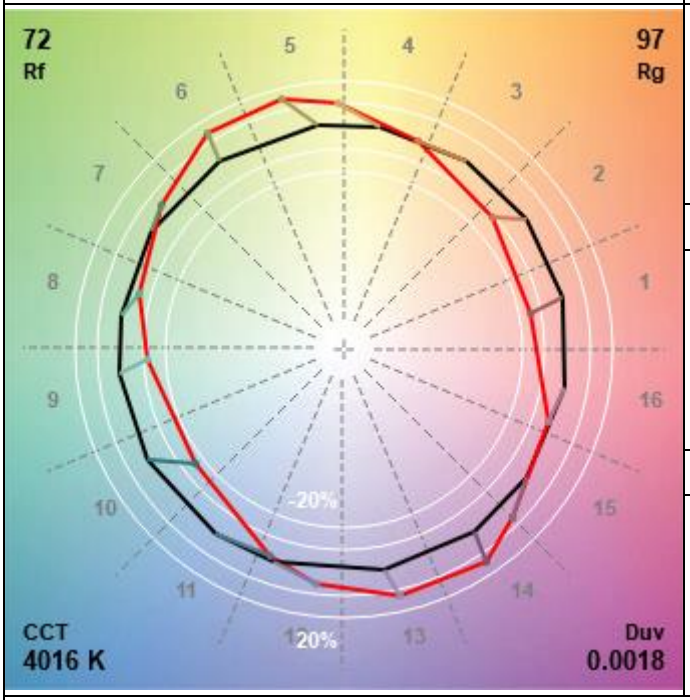


11. BEAM ANGLES

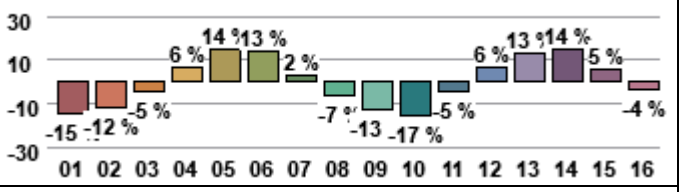
C plane	Beam angle [°]	Gamma max [°]	Start [°]	Stop [°]
0-180	51,6	72,0	25,5	77,1
15-195	34,6	72,0	42,7	77,3
30-210	67,8	66,0	8,4	76,2
45-225	68,0	54,0	-2,5	65,5
60-240	63,9	32,0	-4,2	59,7
75-255	60,4	26,0	-3,6	56,8
90-270	59,6	28,0	-3,7	55,9
105-285	60,9	28,0	-3,8	57,1
120-300	64,8	32,0	-4,2	60,6
135-315	68,4	56,0	-1,2	67,3
150-330	55,7	66,0	20,9	76,7
165-345	37,6	70,0	39,3	77,0

12. TM-30-18 CHARTS AND CALCULATIONS

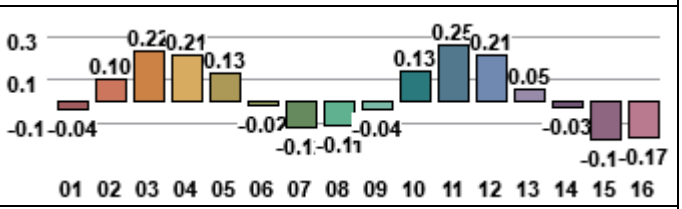
COLOR VECTOR GRAPHIC



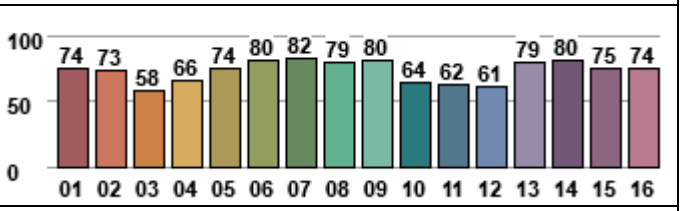
LOCAL CHROMA SHIFTS ($R_{cs,hj}$)



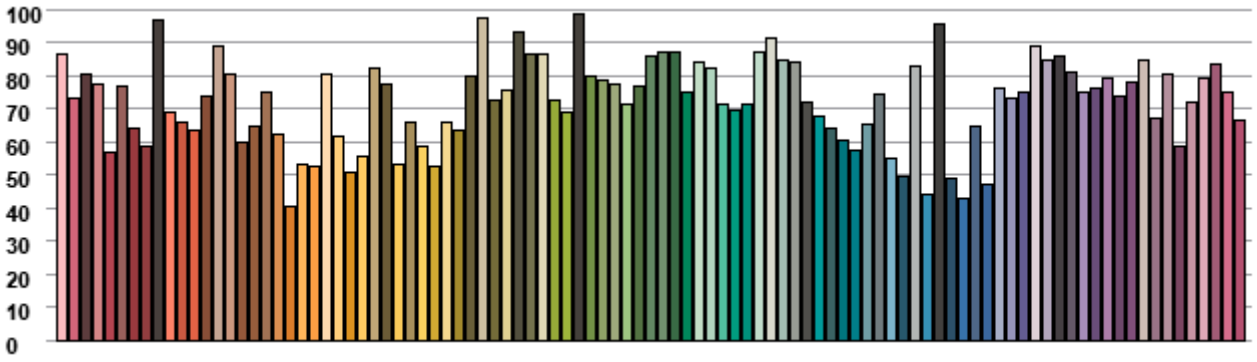
LOCAL HUE SHIFTS ($R_{hs,hj}$)



LOCAL COLOR FIDELITY ($R_{f,hj}$)



COLOR SAMPLE FIDELITY ($R_{f,CESi}$)



MAIN PARAMETERS

Fidelity Index (R_f)	72	Gamut Index (R_g)	97	Skin Index (R_{fskin})	78

LOCAL CHROMA SHIFTS VALUES ($R_{cs,hj}$)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
-15 %	-12 %	-5 %	6 %	14 %	13 %	2 %	-7 %	-13 %	-17 %	-5 %	6 %	13 %	14 %	5 %	-4 %

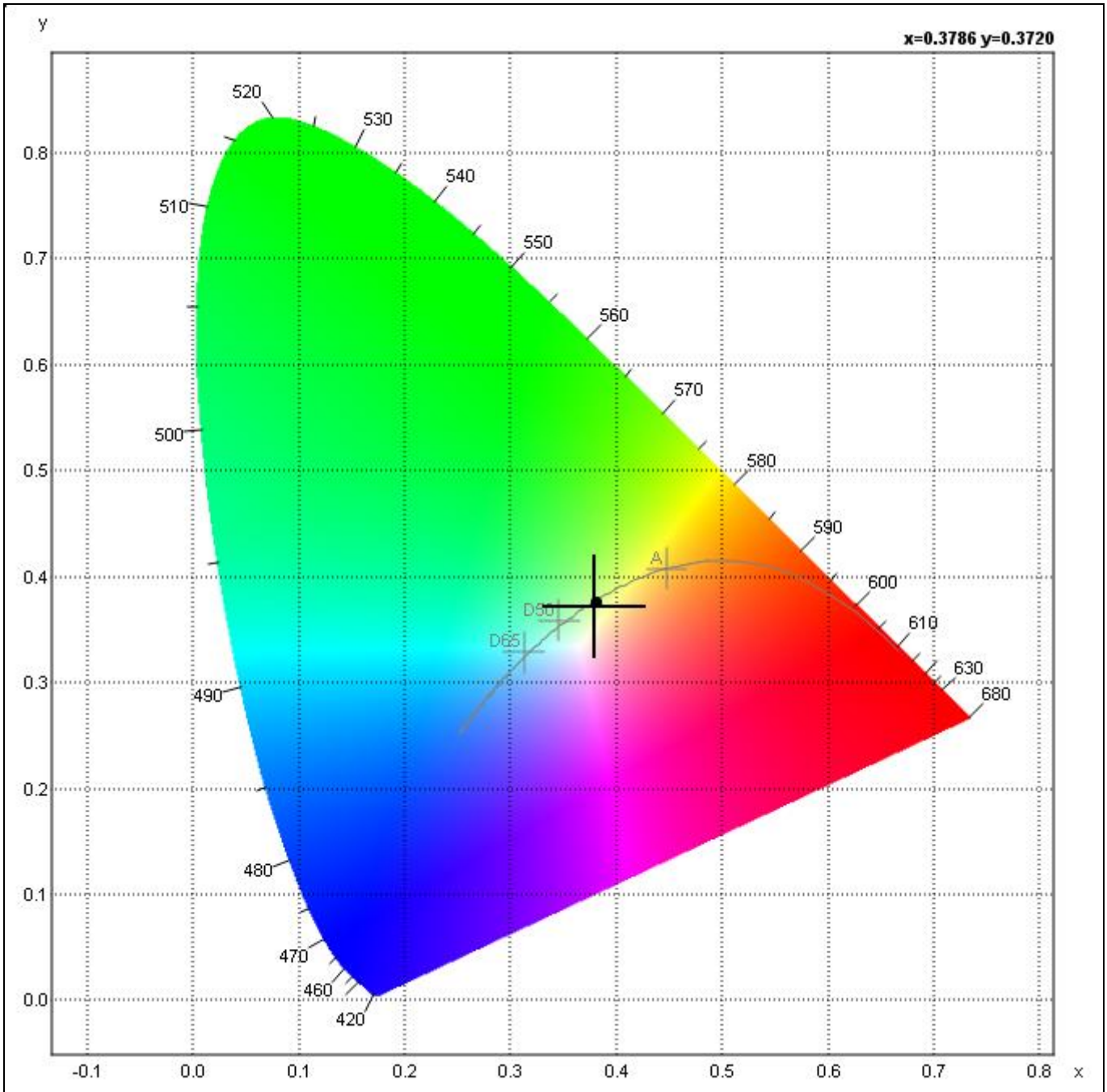
LOCAL HUE SHIFTS VALUES ($R_{hs,hj}$)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
-0,041	0,098	0,22	0,21	0,13	-0,025	-0,12	-0,11	-0,043	0,13	0,25	0,21	0,047	-0,029	-0,18	-0,17

LOCAL COLOR FIDELITY VALUES ($R_{f,hj}$)

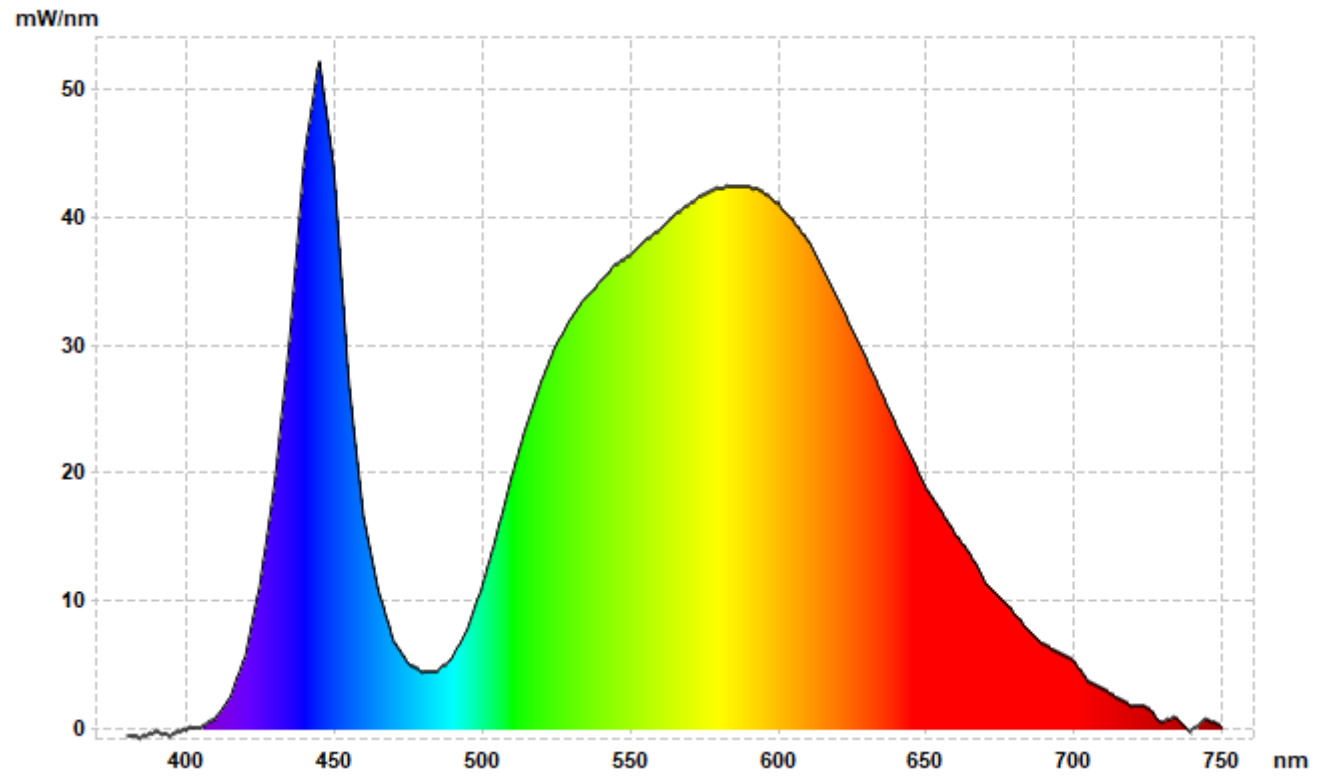
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
74	73	58	66	74	80	82	79	80	64	62	61	79	80	75	74

13. CIE1931 CHART AND COLOURIMETRIC PARAMETERS



CIE 1931 2° OBSERVER		x:	0,3786 ±0,0015
u':	0,2258	y:	0,3720 ±0,0015
v':	0,4992	**OTHER PARAMETERS**	
L:	100,00	CCT:	**4016 K**
a:	11,54	Chromaticity Error:	0,009
b:	29,84	Colour Peak:	445,94 nm
X:	2474,81	Colour Dominant:	580,0 nm
Y:	2431,45	Purity:	0,253
Z:	1630,41	Scotopic/Photopic:	0,60

14. SPECTRUM AND COLOUR RENDERING INDEX



COLOUR RENDERING INDEXES

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
72,4	71,4	77,5	81,5	73,3	70,6	68,2	80,0	56,9	-18,6	46,0	70,1	43,3	71,7	89,1	65,5

15. EQUIPMENT USED

NO.	EQUIPMENT	PRODUCER/TYPE	SERIES	MARK	USED
1.	Goniometer C-γ	GL Optic / GLG-20-1500	G1500-019 4/2017	LAB/UP/26	☒
2.	AC power supply	ITECH / IT7322	602130010727750003	LAB/UP/39	☒
3.	DC power supply	ITECH / IT6724H	600469010727730003	LAB/UP/40	☐
4.	Power meter*	ITECH / IT9121	60217300001045	LAB/PP/11	☐
5.	Spectrometer*	GL Optic / SPECTIS 1.0 VIS GLX10	X0010261/B14W0060	LAB/PP/30	☒
6.	Spectrometer*	GL Optic / SPECTIS 1.0 FLICKER VIS	Xt010065/16J00129	LAB/PP/29	☐
7.	Spectrometer*	GL Optic / SPECTIS 5.0 UV-VIS-NIR	Xt050149/1104N069	LAB/PP/31	☐
8.	Luminance telescope*	GL OPTIC / GL PSM	GL 160324	LAB/UP/27	☐
9.	Thermo-hygrometer*	T&D / TR-72wf	4214 09BA	LAB/UP/37	☐
10.	Photometer*	GL Optic / Photometer 3.0 LS + FLICKER	GL180140	LAB/PP/32	☐

* - Periods nad calibration reports of measuring instruments available upon request.