

PHOTOMETRIC TEST REPORT

LM-79 & EN 13032-4



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_5356_18	Tested by: Krzysztof Olek	Compiled by: Krzysztof Olek
Test date: 2018-02-14	Approved by: Marcin Białas	Client name: A. Pomalecki 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.		

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2. LUMINAIRE DATA

Company:	LUG Light Factory		
Model name:	URBINI LED ED 3900lm.740 O9 szary		
Index:	130232.5L101.101		
Sample No.:	056/3/18		
Power supply:	ELT LCM 42/350...1050-E set to 920mA		
Light source:	LUG ML1600400.W740.02A 12 LED		
LED model:	CREE XPG-3 BIN: S4		
Optic:	O9 PC lens		
Supplementary information:	-		
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, bandwidth 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

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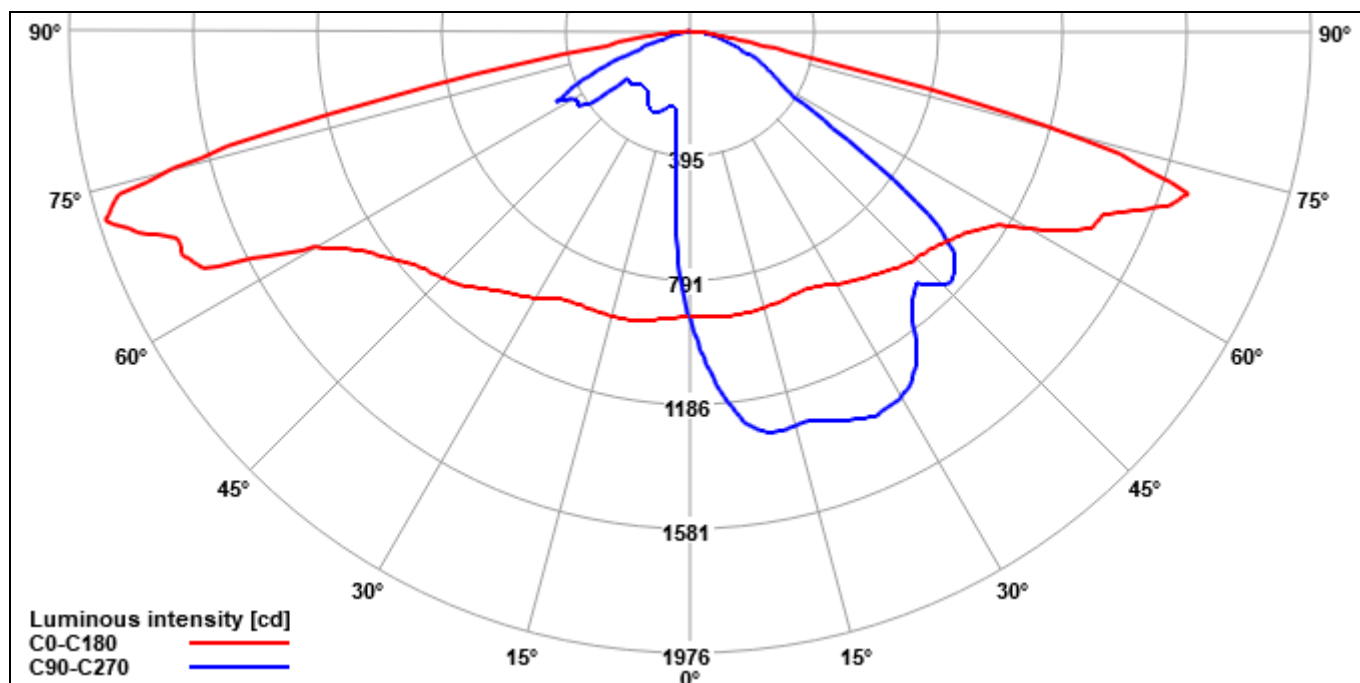
4. ELECTRICAL MEASUREMENTS RESULTS

Voltage:	230 V
Frequency:	50 Hz
Current:	0,167 A
Active power:	36,5 W
Apparent power:	N/A
Reactive power:	N/A
Power factor:	0,948
Current THD:	N/A

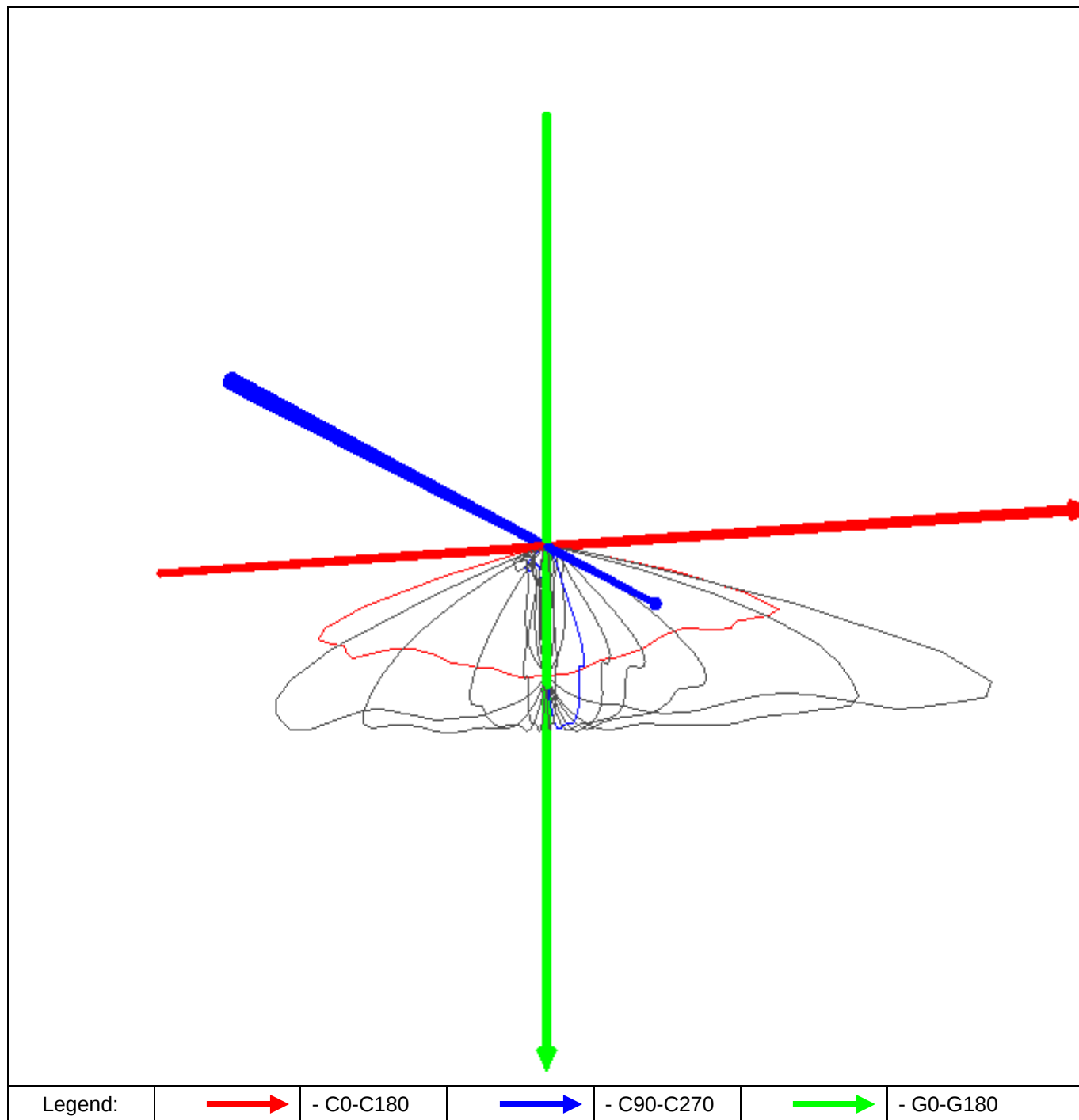
5. GONIOMETRIC MEASUREMENT RESULTS

Total luminous flux:	3960,25 lm, relative measurement uncertainty: $\pm 4,88\%$
Light output ratio (LOR):	100,00%
Lower hemisphere output ratio (DLOR):	100,00%
Upper hemisphere output ratio (ULOR):	-0,00%
Maximum luminous intensity:	3121,94 cd, relative measurement uncertainty: $\pm 4,88\%$
Luminous efficacy:	108,5 lm/W
Colour temperature:	4041
Colour rendering index:	72,40
Angular Colour Uniformity:	0,0325

6. LIGHT INTENSITY DISTRIBUTION DIAGRAM



7. 3D CHART



8. UTILIZATION FACTORS

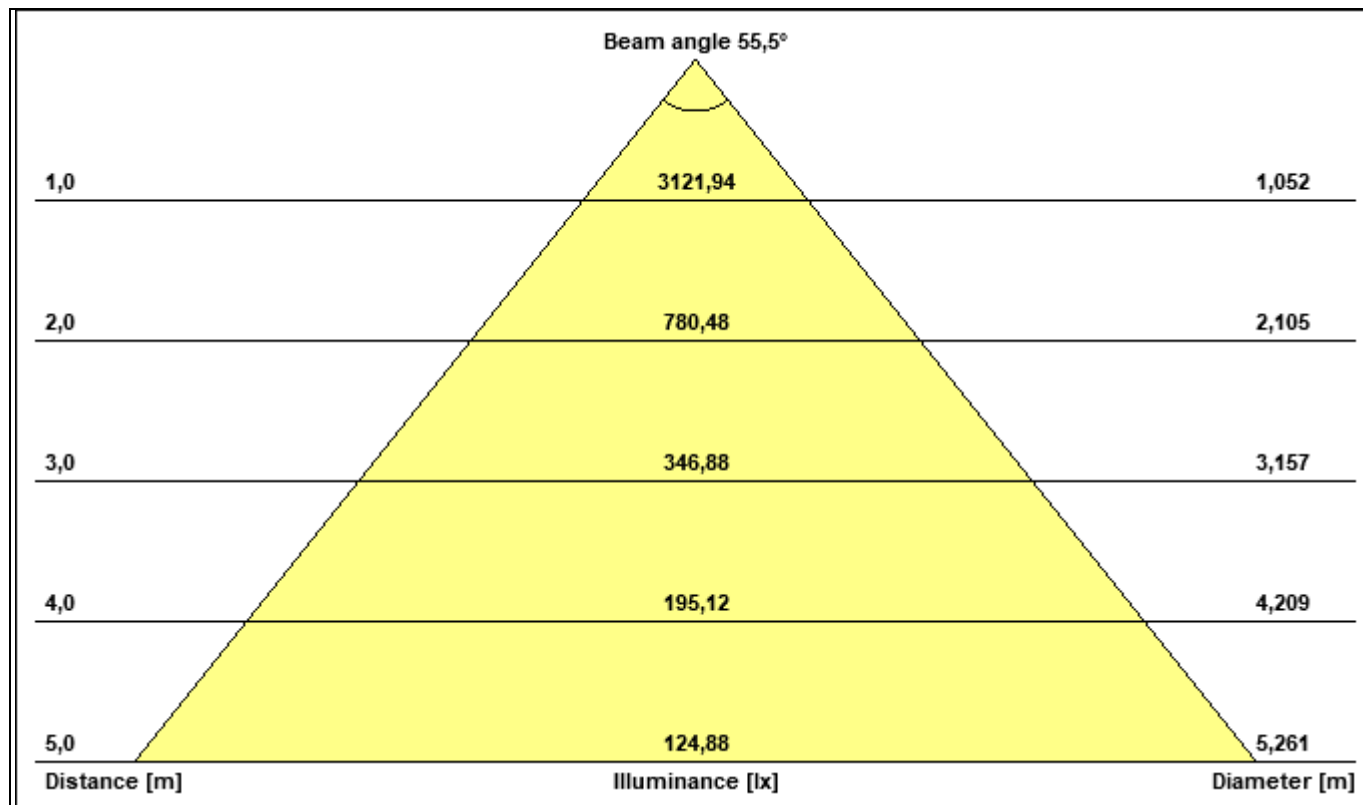
k = 0.60:	0,187	k = 2.00:	0,585
k = 0.80:	0,268	k = 2.50:	0,650
k = 1.00:	0,342	k = 3.00:	0,699
k = 1.25:	0,420	k = 4.00:	0,767
k = 1.50:	0,485	k = 5.00:	0,811

9. LUMINOUS INTENSITY [CD/KLM]

	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°
0°	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4
2°	230,0	237,8	250,6	249,6	253,8	255,9	256,3	254,1	253,9	249,3	244,9	238,8
4°	230,2	246,7	266,2	269,2	275,6	279,0	280,1	277,5	275,8	268,5	260,2	248,0
6°	230,6	254,9	281,0	286,0	294,8	298,7	300,3	298,4	295,3	286,7	274,5	257,6
8°	231,3	262,9	293,3	301,6	312,5	315,7	317,3	315,5	312,7	302,9	288,1	265,9
10°	231,1	269,7	304,5	315,4	325,8	327,5	326,3	326,2	326,3	317,2	299,9	272,8
12°	230,9	275,7	315,0	326,9	333,6	332,1	329,9	331,5	333,4	328,5	311,3	279,0
14°	230,8	281,7	325,9	332,3	332,1	332,0	329,4	330,8	334,4	335,1	321,6	285,7
16°	229,8	287,2	334,2	332,7	330,1	329,8	327,3	328,5	333,0	337,7	330,1	291,8
18°	229,6	293,2	339,3	329,8	328,9	330,2	329,1	329,1	331,7	336,3	336,3	298,9
20°	228,8	297,9	343,6	329,4	329,5	332,8	333,3	333,0	333,9	337,3	341,9	306,2
22°	227,87	302,48	345,71	330,57	331,10	336,57	337,20	336,78	337,80	339,52	346,26	313,48
24°	227,96	307,94	348,14	332,76	334,37	339,98	341,34	341,33	341,79	343,82	349,81	322,63
26°	228,89	316,00	350,24	336,16	336,88	342,95	343,96	345,23	346,87	349,47	355,12	331,62
28°	231,36	326,33	355,35	340,92	340,12	341,79	341,64	344,75	352,07	356,50	361,93	339,84
30°	235,10	336,81	361,53	345,71	340,11	339,01	340,55	343,34	355,19	364,54	368,47	347,49
32°	238,24	346,78	370,10	351,85	339,26	333,60	335,24	341,36	355,60	374,57	377,18	355,61
34°	241,46	356,58	379,20	356,88	334,26	326,30	325,76	336,93	352,22	383,62	387,93	364,35
36°	244,32	365,05	389,44	362,39	324,88	314,95	312,04	326,22	343,36	390,80	401,22	374,18
38°	247,31	373,49	400,59	365,77	314,51	292,35	290,76	302,12	333,88	396,31	415,63	386,74
40°	250,91	382,32	411,49	368,27	302,36	280,78	280,24	286,92	323,52	401,96	429,08	399,09
42°	254,60	390,85	423,89	369,25	294,36	270,13	272,87	276,67	317,04	408,28	443,30	408,28
44°	257,56	398,78	437,91	369,62	288,96	271,73	282,94	278,95	309,65	412,86	457,91	417,29
46°	259,47	406,84	453,24	367,70	293,70	287,14	291,89	296,68	313,40	413,65	472,15	427,51
48°	261,64	415,87	466,71	370,41	310,52	287,25	288,04	297,29	332,35	414,68	486,39	439,49
50°	265,54	426,85	476,86	382,57	318,54	281,35	277,94	292,28	340,24	430,24	500,17	453,86
52°	270,43	438,42	490,11	397,49	314,66	264,48	254,51	276,18	338,11	444,87	515,71	467,89
54°	275,63	452,11	508,13	406,88	298,64	226,37	203,51	239,89	322,97	462,20	537,04	484,95
56°	283,84	471,26	529,25	405,63	259,98	164,17	139,71	172,45	288,61	462,02	560,43	507,17
58°	293,84	495,51	553,99	387,81	196,98	112,46	98,55	117,51	220,67	448,37	592,15	544,53
60°	317,87	533,02	576,57	351,03	140,50	88,91	85,13	91,09	159,33	413,12	633,03	606,99
62°	342,61	587,83	607,78	297,12	98,45	79,87	77,77	79,82	105,67	358,34	682,54	692,20
64°	360,54	659,89	636,09	239,38	76,92	71,89	70,91	71,47	79,65	297,39	711,93	739,42
66°	363,50	700,65	642,34	185,05	66,01	65,98	65,18	66,31	67,05	231,97	702,05	759,06
68°	384,89	742,73	617,60	132,10	58,27	60,59	55,39	60,70	57,34	165,45	664,17	772,93
70°	410,72	787,30	585,04	93,42	53,38	50,60	44,29	49,85	51,45	117,61	602,82	766,42
72°	422,11	788,32	536,17	67,64	50,89	42,36	38,34	42,29	48,74	80,77	521,85	711,38
74°	360,40	698,07	442,06	51,07	47,43	36,90	32,64	36,19	46,41	56,71	413,29	572,26
76°	235,50	445,11	322,70	40,13	43,83	31,24	27,25	30,97	43,00	40,79	280,53	269,44
78°	81,21	174,96	186,12	31,99	39,31	25,83	22,03	25,62	39,85	31,48	143,25	100,42
80°	40,11	85,26	78,98	27,80	35,24	20,96	17,24	20,24	38,03	26,23	56,04	54,38
82°	24,36	43,19	40,50	24,80	33,20	15,60	12,69	15,47	39,15	20,62	31,50	29,63
84°	13,70	15,99	23,65	20,61	31,58	10,46	8,02	10,69	36,35	15,29	17,18	9,59
86°	6,11	6,69	13,16	13,67	25,25	6,40	5,31	7,17	25,67	10,34	8,32	5,13
88°	2,82	3,93	7,77	7,39	15,87	3,41	2,53	3,43	15,48	5,52	5,06	2,31
90°	0,86	1,84	5,29	3,87	6,69	1,22	1,52	1,96	6,62	2,89	2,53	1,81

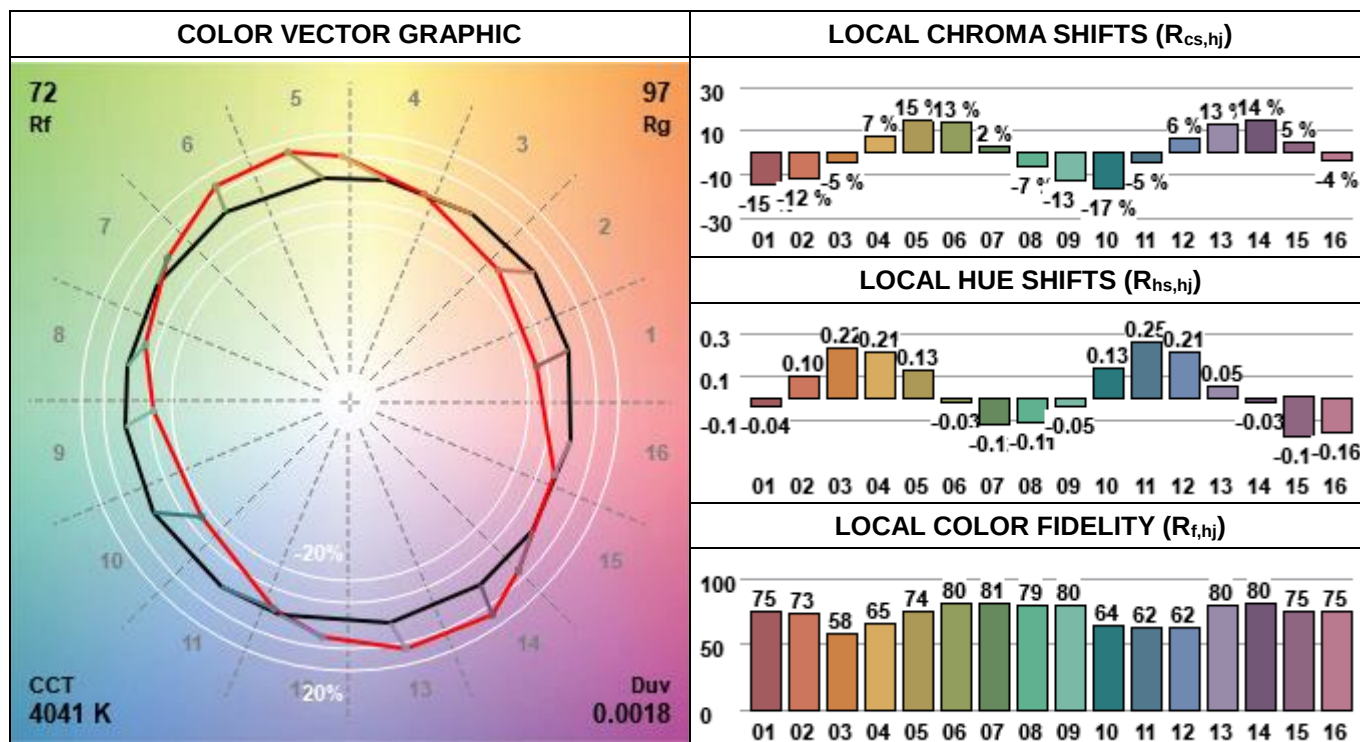
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	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
0°	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4	229,4
2°	230,3	220,6	217,9	205,5	200,8	198,1	197,9	197,7	202,5	206,1	213,5	221,0
4°	230,9	211,3	197,8	177,1	164,8	156,8	155,5	157,2	167,5	179,0	194,7	211,6
6°	233,1	202,4	174,5	139,0	115,0	102,0	98,8	103,5	119,8	143,8	173,0	202,2
8°	234,9	191,6	146,2	98,5	78,8	71,7	70,0	71,4	80,2	103,0	147,7	191,5
10°	236,5	180,0	114,8	76,1	66,5	63,5	62,4	62,7	65,9	76,6	118,8	180,3
12°	237,3	166,3	90,4	66,9	63,4	62,2	61,8	61,1	61,8	66,8	92,1	168,6
14°	237,4	151,1	76,5	63,5	62,8	63,0	62,1	61,8	61,5	62,4	76,5	154,9
16°	237,4	135,5	69,3	62,5	63,2	64,2	64,3	63,2	62,5	60,7	68,4	139,5
18°	237,1	119,0	64,4	61,6	63,6	65,9	66,4	65,9	62,9	60,8	63,6	124,4
20°	237,3	103,5	62,2	60,5	64,1	68,3	69,0	68,0	64,6	60,6	61,2	109,8
22°	236,87	90,86	60,49	60,09	65,36	69,82	71,13	70,43	65,82	60,28	60,54	96,52
24°	237,56	82,06	58,86	58,91	65,37	71,13	71,62	71,02	66,55	60,13	58,04	85,69
26°	239,16	74,99	56,96	57,68	64,99	70,09	70,60	70,69	67,07	59,46	56,52	77,68
28°	243,28	70,26	54,73	56,17	63,14	67,99	68,57	69,31	65,95	58,63	55,12	72,10
30°	247,77	66,98	53,00	54,36	60,16	65,87	65,89	67,13	63,60	56,69	53,66	67,39
32°	251,64	63,72	51,08	51,71	56,57	62,58	63,27	63,57	60,49	54,36	51,45	64,30
34°	254,56	60,91	49,55	49,32	52,88	59,87	59,45	60,12	57,19	51,93	49,78	61,17
36°	258,30	58,68	47,37	46,22	49,93	57,36	57,99	58,26	53,49	48,41	48,18	58,80
38°	263,40	56,94	45,95	43,08	47,32	56,63	57,61	56,75	50,46	45,60	47,04	56,53
40°	268,82	54,87	43,88	40,76	44,66	56,49	57,13	56,19	46,84	42,76	45,31	55,02
42°	274,53	52,77	42,45	38,21	43,24	56,74	57,66	56,45	45,21	39,71	43,68	54,03
44°	278,81	51,85	40,25	35,91	41,55	57,37	59,28	57,22	43,78	37,42	42,03	52,30
46°	282,40	49,58	38,33	34,11	40,06	59,26	62,47	58,88	43,14	36,15	40,30	51,15
48°	285,51	48,14	36,22	32,67	39,63	60,75	63,66	60,19	42,57	35,11	38,13	49,62
50°	290,77	46,76	34,19	31,59	39,46	58,41	61,34	59,43	41,26	32,45	36,41	48,39
52°	298,86	45,33	31,80	29,68	37,88	55,86	62,37	55,82	39,37	31,33	34,71	47,18
54°	306,75	43,59	30,55	28,34	36,50	77,16	98,90	69,62	37,91	29,79	32,04	45,29
56°	315,82	41,56	28,04	27,40	35,72	100,58	107,89	94,84	36,94	28,59	30,45	43,22
58°	329,10	43,02	27,75	25,78	40,97	105,80	105,64	100,79	39,48	27,21	28,33	42,17
60°	347,09	50,56	25,87	24,41	48,22	104,43	108,76	101,56	47,61	25,65	27,59	42,80
62°	384,18	57,12	24,86	23,32	52,41	105,25	120,66	103,98	54,22	24,10	26,07	45,22
64°	434,87	54,02	23,21	22,51	53,70	106,81	102,26	109,26	56,95	23,32	24,62	43,03
66°	444,25	43,91	20,81	22,22	53,65	106,22	87,48	107,27	56,28	22,07	23,00	35,84
68°	443,95	39,00	20,58	21,74	51,57	96,65	59,38	97,01	55,95	21,55	22,12	31,72
70°	471,27	36,65	20,89	21,65	44,47	73,80	42,43	77,55	52,05	21,31	21,88	29,00
72°	494,10	31,02	22,50	21,26	39,14	49,40	24,09	54,87	46,87	20,72	23,33	25,99
74°	475,70	27,45	25,74	20,37	34,80	34,32	13,94	39,73	43,34	20,70	24,64	23,33
76°	382,15	22,75	25,97	18,45	29,45	24,13	1,78	28,75	39,62	20,23	25,02	19,47
78°	212,34	17,54	23,30	16,19	24,58	16,95	0,00	21,33	33,42	18,71	23,68	15,74
80°	65,73	11,90	19,52	13,71	19,34	12,12	0,10	15,18	26,71	16,48	20,49	11,00
82°	33,62	8,47	14,10	10,89	15,06	8,69	0,10	10,39	20,39	14,10	16,50	8,39
84°	16,93	5,50	9,78	8,65	11,79	5,94	0,07	7,25	16,03	10,53	12,35	6,09
86°	7,75	4,05	6,37	5,89	9,12	3,64	0,02	4,80	12,37	7,39	8,11	4,00
88°	4,26	2,68	3,93	3,75	6,51	2,47	0,00	3,56	7,83	4,52	5,03	2,86
90°	1,48	1,64	2,53	2,70	3,63	1,56	0,30	1,51	4,87	2,11	2,87	2,40

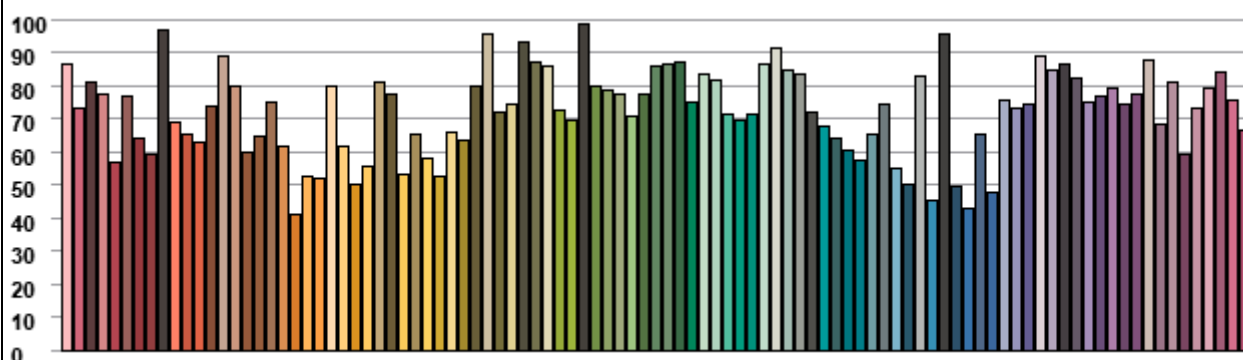
10. BEAM CONE

11. BEAM ANGLES

C plane	Beam angle [°]	Gamma max [°]	Start [°]	Stop [°]
0-180	47,9	-72,0	-77,6	-29,7
15-195	33,5	72,0	42,8	76,4
30-210	62,9	66,0	13,1	76,0
45-225	67,5	54,0	-2,1	65,3
60-240	62,7	28,0	-3,7	59,0
75-255	59,1	26,0	-3,3	55,8
90-270	58,2	26,0	-3,2	55,0
105-285	59,2	26,0	-3,2	56,0
120-300	62,8	32,0	-3,4	59,4
135-315	65,9	54,0	0,2	66,0
150-330	48,6	64,0	26,2	74,9
165-345	37,3	68,0	38,0	75,2

12. TM-30-18 CHARTS AND CALCULATIONS



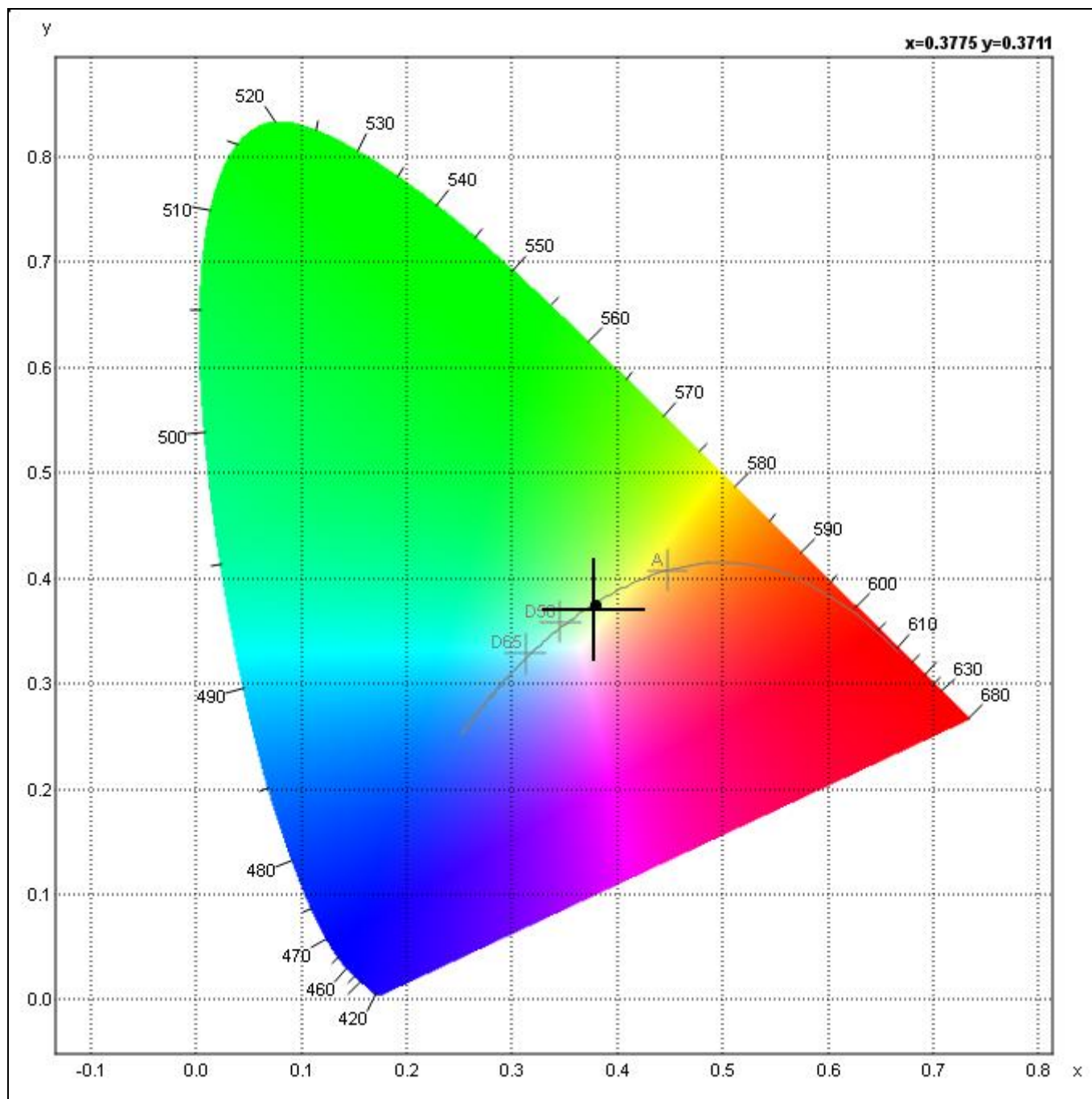
COLOR SAMPLE FIDELITY ($R_{f,CESi}$)



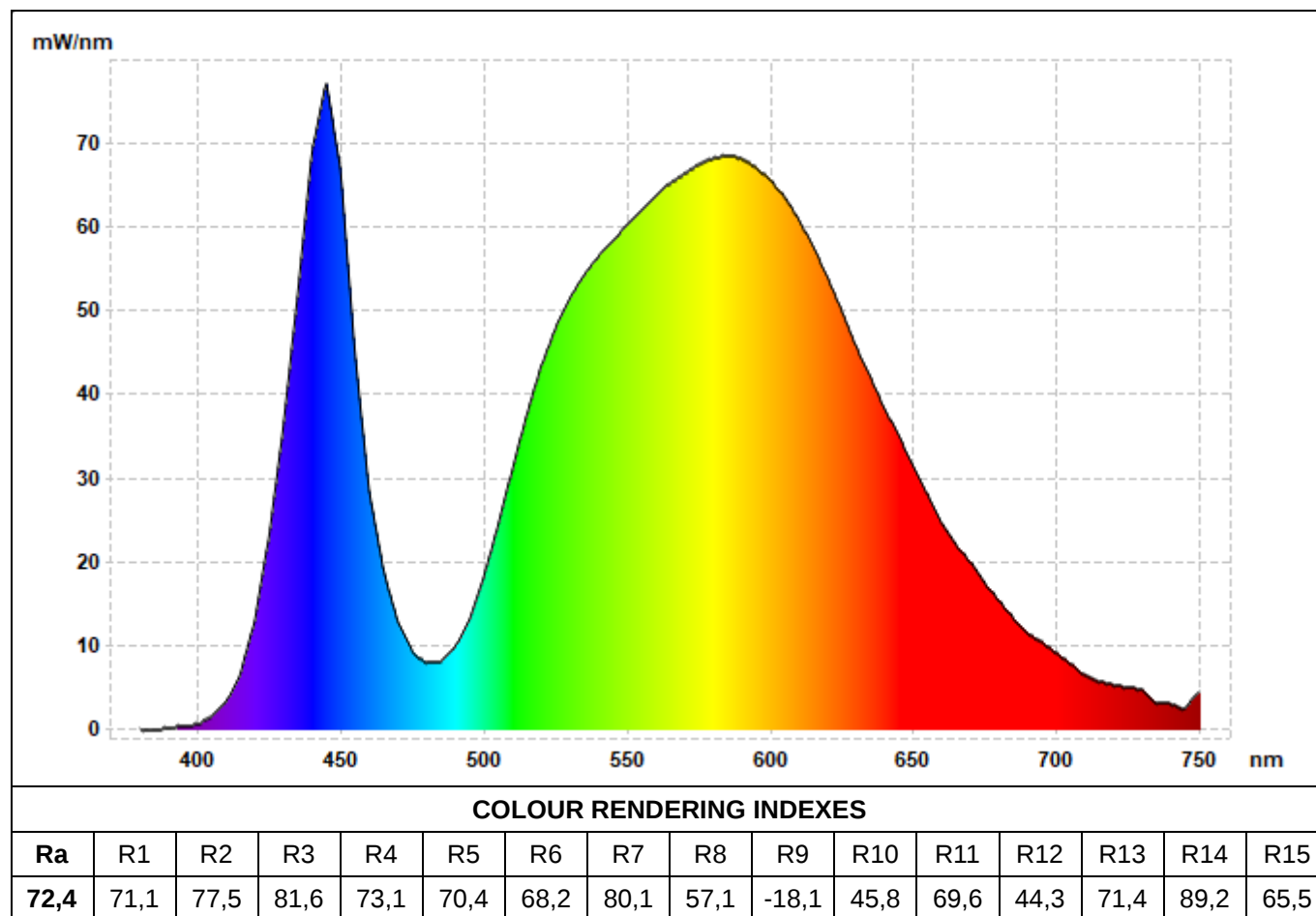
MAIN PARAMETERS

Fidelity Index (R_f)			72		Gamut Index (R_g)			97			Skin Index ($R_{f,skin}$)			77	
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 %	7 %	15 %	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
-0,04	0,099	0,22	0,21	0,13	-0,026	-0,12	-0,11	-0,046	0,13	0,25	0,21	0,049	-0,028	-0,18	-0,16
LOCAL COLOR FIDELITY VALUES ($R_{f,hj}$)															
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
75	73	58	65	74	80	81	79	80	64	62	62	80	80	75	75

13. CIE1931 CHART AND COLOURIMETRIC PARAMETERS



CIE 1931 2° OBSERVER		x:	0,3775 ±0,0015
u':	0,2254	y:	0,3711 ±0,0015
v':	0,4986	OTHER PARAMETERS	
L:	100,00	CCT:	4041 K
a:	11,42	Chromaticity Error:	0,009
b:	29,27	Colour Peak:	444,09 nm
X:	3987,77	Colour Dominant:	580,0 nm
Y:	3920,71	Purity:	0,247
Z:	2655,41	Scotopic/Photopic:	0,60

14. SPECTRUM AND COLOUR RENDERING INDEX

15. EQUIPMENT USED

NO.	EQUIPMENT	PRODUCER/TYPE	SERIES	MARK	USED
1.	Goniometer C-y	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.