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_09_10629_22	Tested by: Krzysztof Olek	Compiled by: Krzysztof Olek
Test date: 2022-04-25	Approved by: Marcin Białas	Client name: M. Raczyński 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

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Location: Moldova

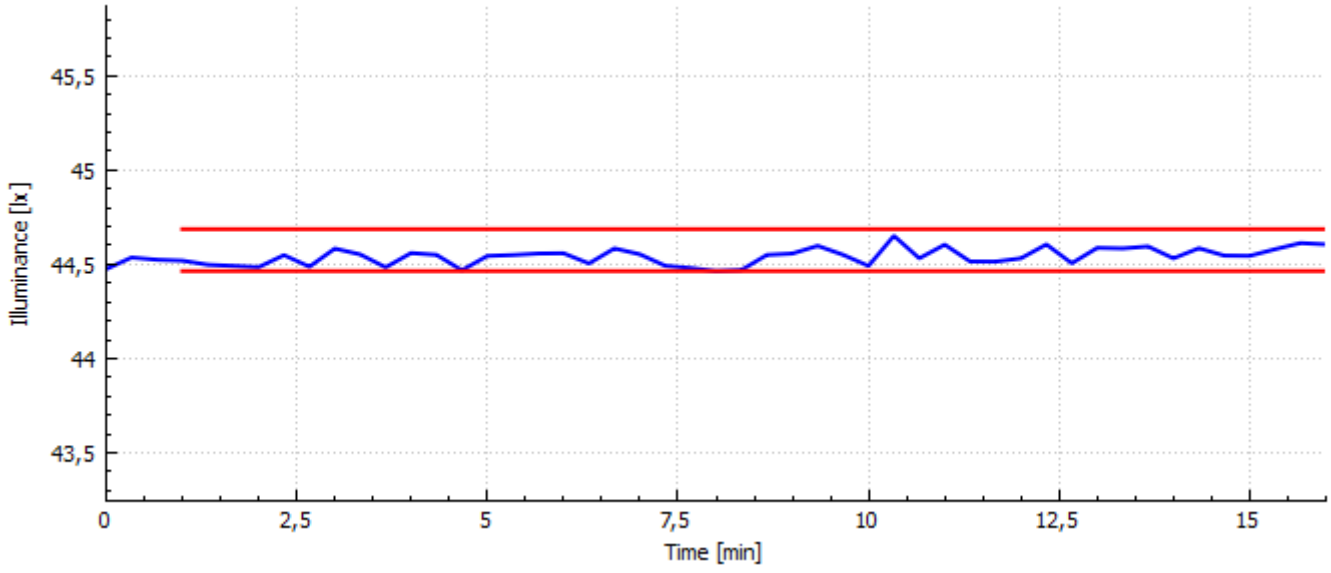
2. LUMINAIRE DATA

Company:	LUG Light Factory
Model name:	CLS-CRUISER 2 LB LED ED 12900lm/840 IP66 100st. Szary
Index:	903092.01798
Sample No.:	197/2/22
Power supply:	Osram OT 110/170-240/1A0 4DIMLT2 G2 CE set to 550mA
Light source:	2xLUG ML1502200.W840.01A 150 LED
LED model:	Seoul 2835
Optic:	4mm glass
Supplementary information:	-

Dimensions of luminaire:		**Dimensions of luminous area:**	
Length:	1206 mm	Length:	1200 mm
Width:	61 mm	Width:	57 mm
Height:	80 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:	10,152 ±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



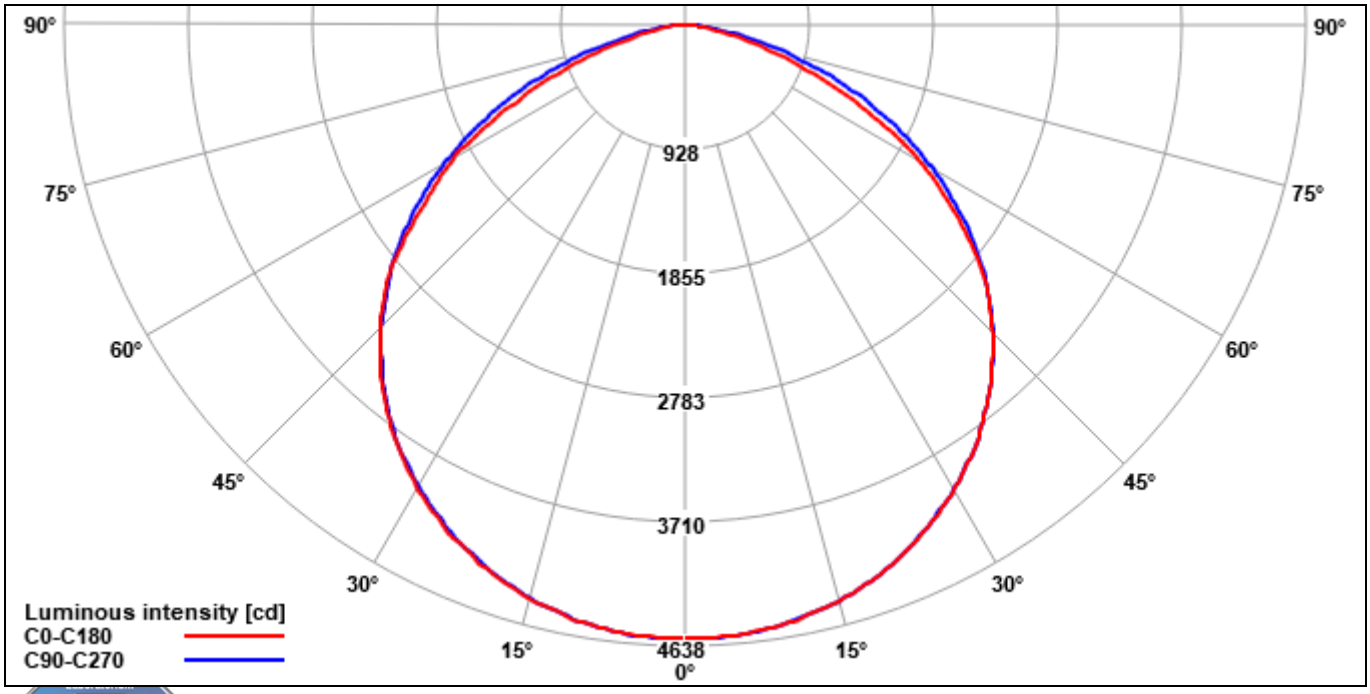
4. ELECTRICAL MEASUREMENTS RESULTS

Voltage:	229,674 ±0,6 V
Frequency:	50,003 ±0,037 Hz
Current:	0,369 ±0,005 A
Active power:	83,101 ±1,361 W
Apparent power:	84,714 ±0,628 VA
Reactive power:	-16,450 ±0,628 var
Power factor:	0,981 ±0,012
Current THD:	6,408 ±0,456%

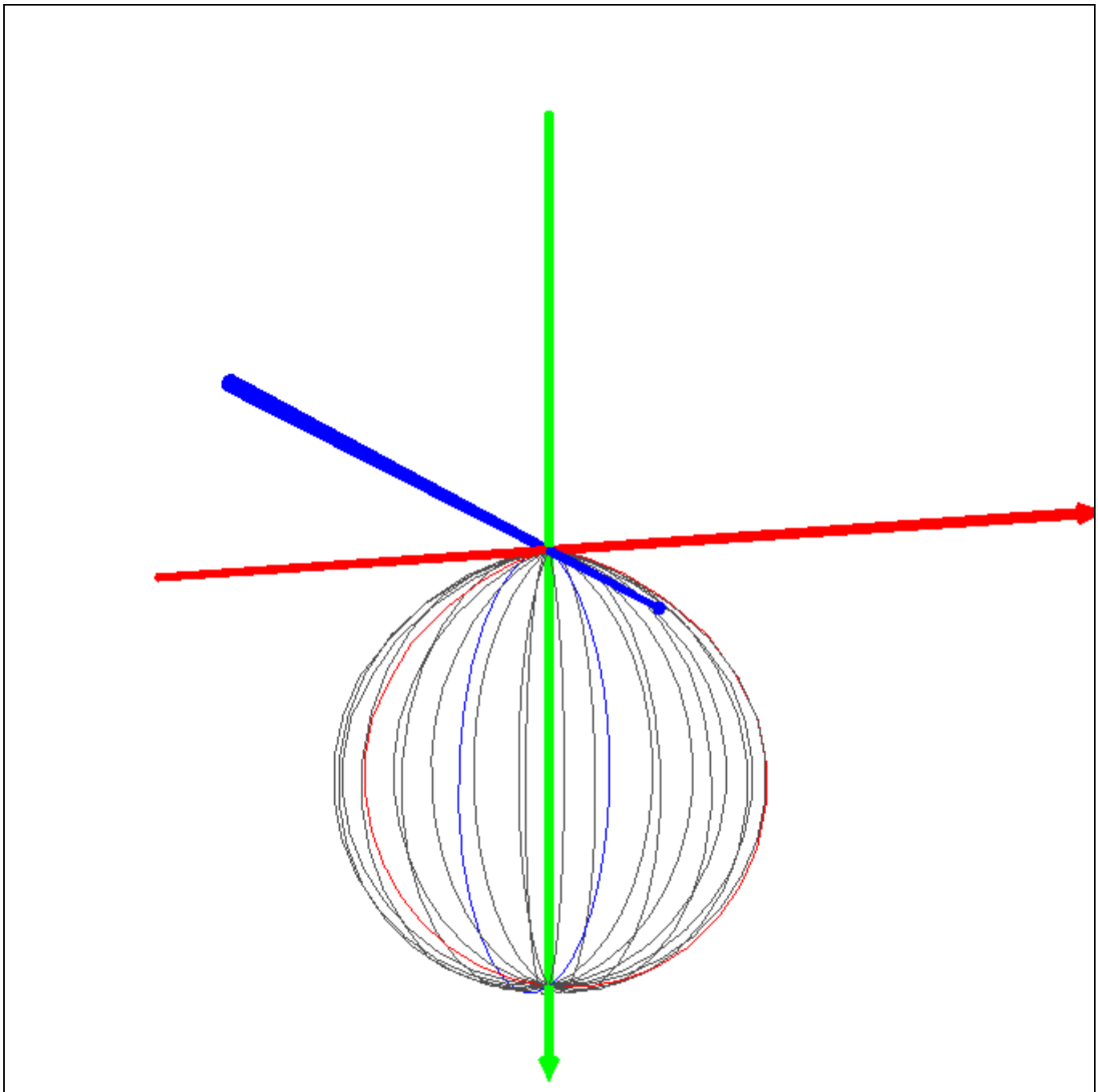
5. GONIOMETRIC MEASUREMENT RESULTS

Total luminous flux:	**12951,83 lm, relative measurement uncertainty: ±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:	4592,18 cd, relative measurement uncertainty: ±4,88%
Luminous efficacy:	155,86 lm/W, relative measurement uncertainty: ±4,99%
Colour temperature:	4101
Colour rendering index:	81,97
Angular Colour Uniformity:	0,0069

6. LIGHT INTENSITY DISTRIBUTION DIAGRAM



7. 3D CHART



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

8. UTILIZATION FACTORS

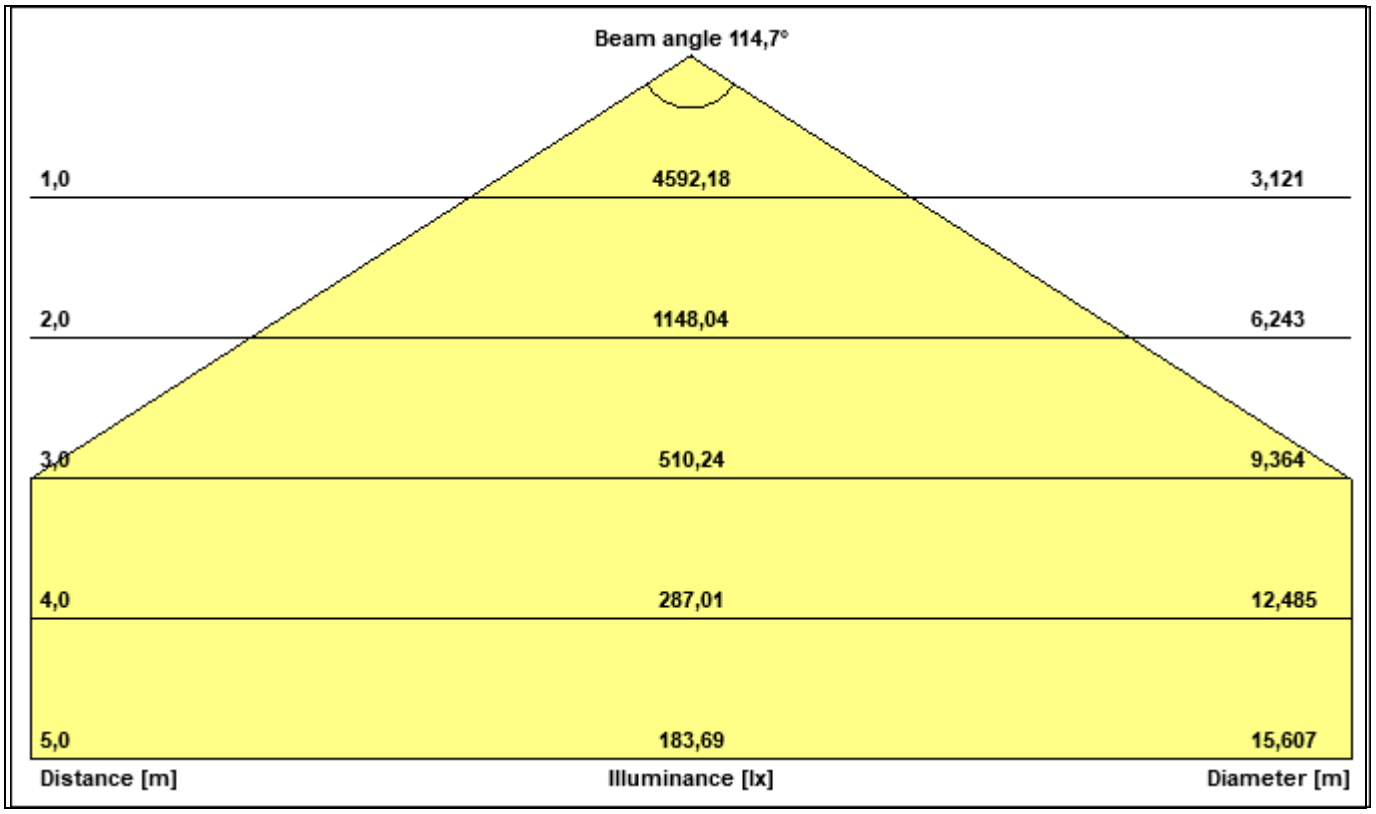
k = 0.60:	0,289	k = 2.00:	0,697
k = 0.80:	0,384	k = 2.50:	0,747
k = 1.00:	0,466	k = 3.00:	0,785
k = 1.25:	0,545	k = 4.00:	0,835
k = 1.50:	0,606	k = 5.00:	0,865

9. LUMINOUS INTENSITY [CD/KLM]

	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°
0°	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56
5°	353,89	353,82	354,28	353,95	354,45	354,10	354,24	354,19	354,15	353,86	354,20	353,84
10°	350,70	350,50	350,99	351,05	350,70	350,58	350,55	350,89	350,62	350,63	350,80	351,01
15°	344,81	344,37	344,52	345,21	344,95	344,29	344,77	344,81	344,93	344,68	344,81	344,46
20°	336,47	335,93	336,13	336,39	336,36	335,95	336,58	336,37	336,30	335,80	336,39	335,89
25°	324,85	324,52	324,97	324,88	324,91	324,30	324,66	324,81	324,90	324,96	325,17	324,27
30°	310,98	310,02	312,52	310,92	310,96	310,08	310,67	310,92	311,00	311,14	310,83	309,57
35°	294,64	293,76	294,25	294,00	294,50	293,39	294,43	293,89	294,25	294,25	293,97	293,20
40°	274,53	273,97	275,27	274,35	275,25	273,74	274,73	274,07	274,33	274,34	274,44	274,04
45°	251,93	251,36	252,47	252,01	252,42	251,14	252,49	251,44	252,00	252,05	251,62	251,11
50°	226,04	225,51	226,56	225,98	227,34	225,77	226,26	225,62	226,49	225,58	225,70	225,15
55°	190,97	193,52	197,78	197,43	198,45	196,96	197,23	197,15	197,68	197,14	196,82	191,13
60°	157,33	156,72	157,89	164,57	165,56	165,12	165,49	164,61	165,10	164,36	157,51	156,32
65°	112,53	114,61	123,83	123,29	130,76	129,29	129,82	128,73	130,21	123,53	123,16	115,10
70°	71,91	73,22	80,24	87,00	92,72	92,57	93,24	92,40	91,33	85,89	79,71	73,44
75°	37,73	37,33	42,59	46,29	54,31	55,78	56,41	55,48	53,65	45,53	41,48	37,02
80°	9,87	9,81	12,64	15,28	20,20	22,68	23,36	22,45	19,71	14,52	12,33	9,58
85°	0,81	0,78	0,82	0,74	1,49	1,90	2,41	1,83	1,34	0,76	0,84	0,79
90°	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
0°	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56	354,56
5°	353,50	353,10	353,64	353,62	353,60	353,48	353,77	353,55	353,17	353,67	353,98	353,88
10°	349,66	349,61	349,71	349,89	349,55	349,47	349,65	350,14	349,01	349,94	350,38	350,39
15°	343,30	343,24	343,23	343,68	343,40	343,14	343,03	343,14	342,71	343,82	343,65	344,13
20°	334,33	333,87	334,25	334,45	337,05	334,08	333,76	334,24	333,29	334,56	334,60	335,24
25°	322,75	322,29	322,65	322,78	322,00	322,30	321,60	322,47	321,56	323,64	322,93	322,72
30°	308,22	308,35	307,97	308,61	307,75	308,04	307,04	308,03	307,64	309,14	308,60	308,96
35°	291,05	291,67	290,78	291,17	290,55	290,88	290,39	290,82	290,57	291,97	291,00	291,66
40°	270,99	271,35	270,66	271,03	270,50	270,80	269,95	270,89	270,98	271,90	270,88	271,70
45°	248,10	248,09	247,61	247,96	247,06	247,84	246,71	247,58	246,94	249,05	247,93	249,37
50°	221,48	222,23	221,27	221,50	220,66	221,69	220,17	221,30	220,79	222,47	221,66	222,84
55°	183,87	186,28	192,11	192,57	191,51	192,47	191,08	192,44	191,61	193,34	192,25	189,56
60°	152,23	152,78	151,98	159,78	158,85	159,69	158,73	160,10	158,84	160,37	152,48	153,66
65°	106,82	110,23	116,29	118,31	123,52	123,62	122,78	124,15	123,52	119,33	117,63	109,61
70°	66,80	69,51	74,18	79,79	82,45	87,21	85,85	87,37	84,42	81,58	74,81	68,98
75°	31,91	34,81	35,58	41,15	46,43	50,58	49,81	50,94	47,30	40,77	35,20	35,29
80°	6,65	7,93	9,23	12,66	15,49	18,17	17,56	18,15	15,53	12,66	9,42	8,28
85°	0,63	0,69	0,64	0,63	0,62	1,02	0,86	1,09	0,65	0,63	0,63	0,68
90°	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

10. BEAM CONE

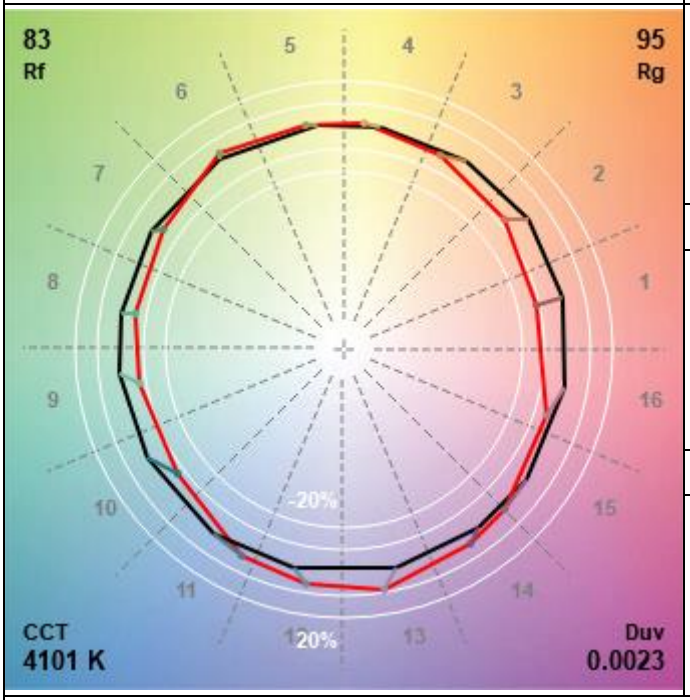


11. BEAM ANGLES

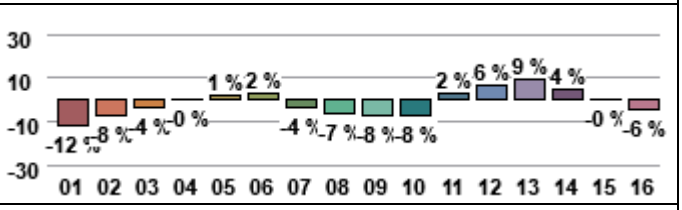
C plane	Beam angle [°]	Gamma max [°]	Start [°]	Stop [°]
0-180	113,1	0,0	-56,0	57,0
15-195	113,5	0,0	-56,3	57,2
30-210	114,4	0,0	-56,8	57,6
45-225	115,4	0,0	-57,3	58,1
60-240	115,4	0,0	-57,2	58,2
75-255	115,4	0,0	-57,3	58,1
90-270	115,3	0,0	-57,1	58,1
105-285	115,4	0,0	-57,3	58,1
120-300	115,3	0,0	-57,2	58,1
135-315	115,5	0,0	-57,4	58,0
150-330	114,4	0,0	-56,9	57,5
165-345	113,7	0,0	-56,7	57,0

12. TM-30-18 CHARTS AND CALCULATIONS

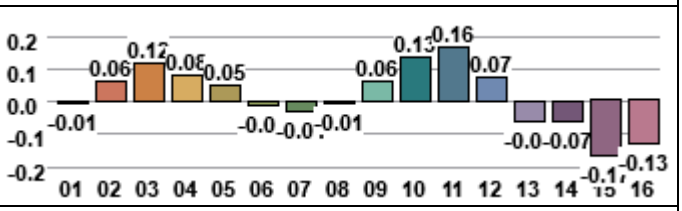
COLOR VECTOR GRAPHIC



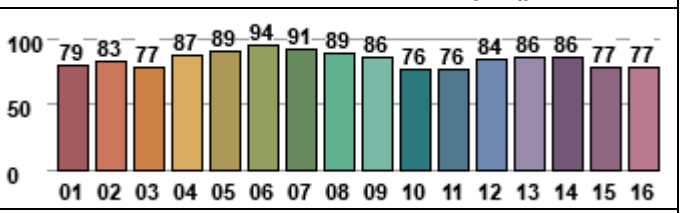
LOCAL CHROMA SHIFTS ($R_{cs,hj}$)



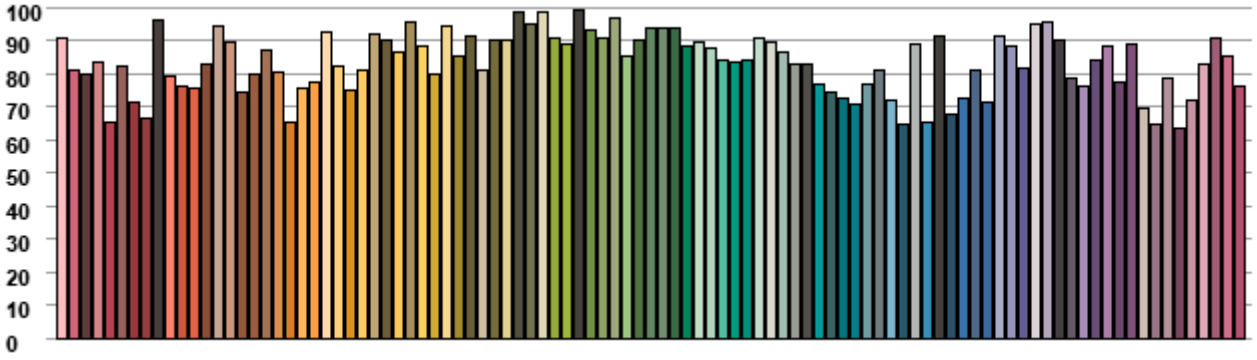
LOCAL HUE SHIFTS ($R_{hs,hj}$)



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



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



MAIN PARAMETERS

Fidelity Index (R_f)	83	Gamut Index (R_g)	95	Skin Index (R_{fskin})	88

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

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
-12 %	-8 %	-4 %	-0 %	1 %	2 %	-4 %	-7 %	-8 %	-8 %	2 %	6 %	9 %	4 %	-0 %	-6 %

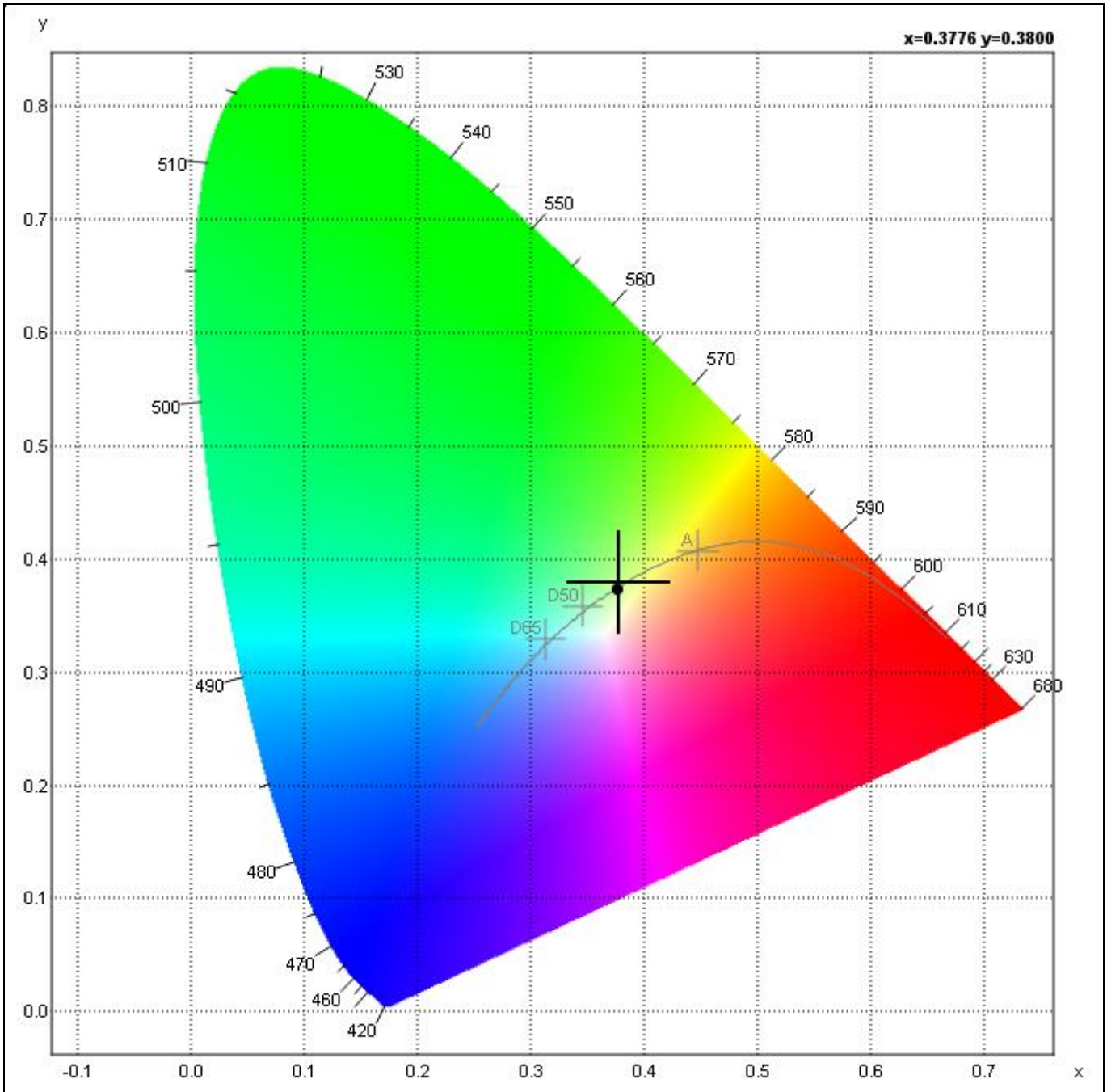
LOCAL HUE SHIFTS VALUES ($R_{hs,hj}$)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
-0,01	0,059	0,12	0,078	0,045	-0,017	-0,037	-0,012	0,059	0,13	0,16	0,072	-0,065	-0,067	-0,17	-0,13

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

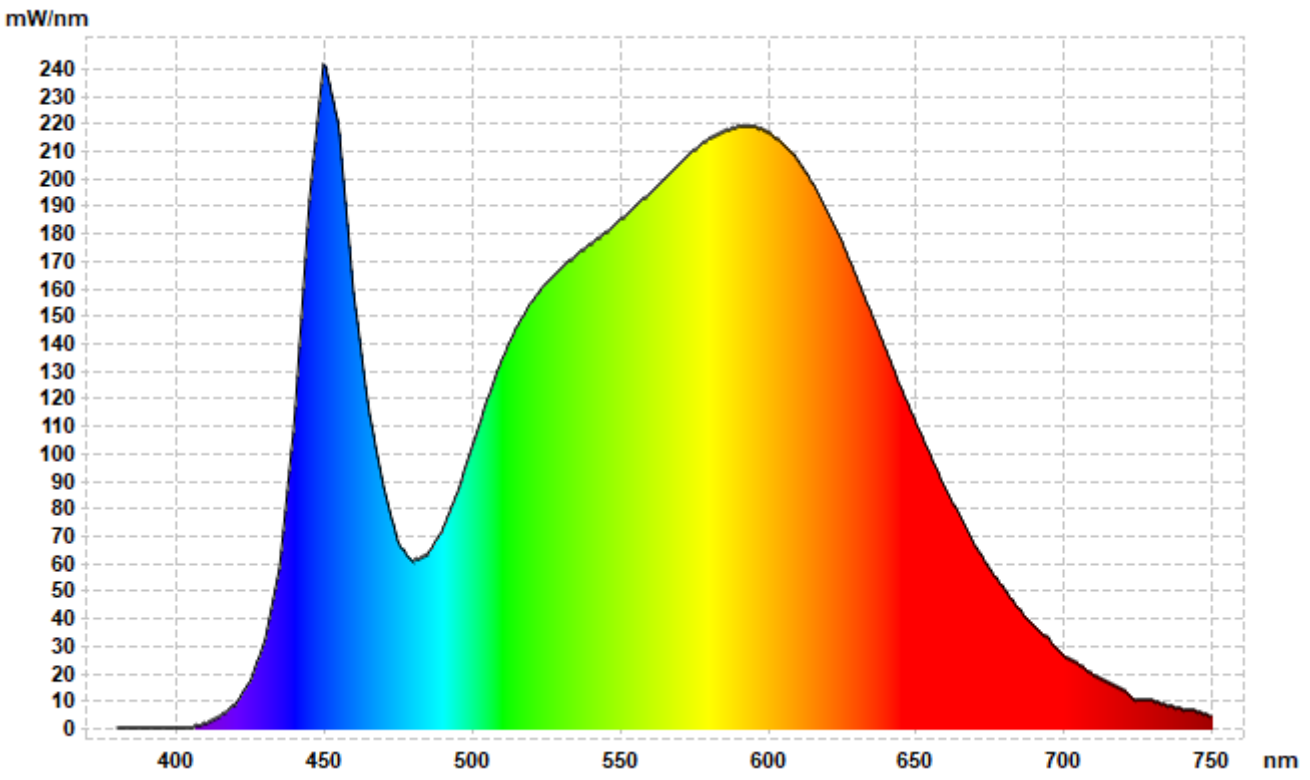
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
79	83	77	87	89	94	91	89	86	76	76	84	86	86	77	77

13. CIE1931 CHART AND COLOURIMETRIC PARAMETERS



CIE 1931 2° OBSERVER		x:	0,3776 ±0,0015
u':	0,2220	y:	0,3800 ±0,0015
v':	0,5026	**OTHER PARAMETERS**	
L:	100,00	CCT:	**4101 K**
a:	7,49	Chromaticity Error:	0,003
b:	32,64	Colour Peak:	451,46 nm
X:	12871,62	Colour Dominant:	577,4 nm
Y:	12951,81	Purity:	0,274
Z:	8262,79	Scotopic/Photopic:	0,68

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
82,0	80,1	87,5	93,2	81,3	79,8	82,5	86,8	64,6	5,7	70,0	79,8	57,0	81,8	96,2	73,6

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	☒
11.	AC power supply	ITECH / IT7622	802961053767230005	LAB/UP/44	☒

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