

Goniophotometric Test Report



TEST ARTEFACT

The measurement device (DUT) was LED light. The burning position of the DUT was not changed during the measurements.
Customer: Secto design Oy

MEASUREMENT METHOD

The test method is with accordance of LM-79-08 / CIE S025 test standards. The measurements were made by a goniopspectrophotometer SSL C-1R.1600.4A at the dark room of SSL Resource Ltd.

The spectral radiant intensities of a light source at different directions were measured with a calibrated spectrometer located at a known distance from the light source.

MEASUREMENT UNCERTAINTY

The photometer (SSL L-200, sn L200-004, Measuring head LH200-003) used in goniophotometer is traceable to national standard of illuminance

responsivity at PTB (Certificate of calibration CR 0054 signed on 6 March 2019). The power meter and supply of type TDK Lambda is traceable national standard of electrical parameters at NIST (Calibration date 5 February 2018). The expanded uncertainties of the luminous flux and efficacy are $\pm 3.8\%$ and $\pm 4.0\%$ ($k = 2$), respectively.

MEASUREMENTS

Table below describes the measurement conditions. The luminaire under test and photometer/spectrometer were mounted onto the same optical axis and perpendicular by an alignment laser. The measurement distance from the rotation axis to the photometer optical receiving surface was measured by laser distance meter.

Table - Measurement information

Ambient temperature of the laboratory	25.0 degC
Power supply	230.0 Vac
Measurement distance	8748 mm
Location of the rotation axis (behind the outermost surface of the optics)	55 mm
Angular step, C plane	15.0 deg
Angular step, gamma angle	2.5 deg
Maximum gamma angle	180.0 deg
Stabilization time	45 min

Table. Luminous intensity data (cd) at measured C planes (rows) and gamma angles (columns)

	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345
0.0	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212
2.5	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212
5.0	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
7.5	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209
10.0	206	206	206	206	206	207	207	207	206	206	206	206	206	206	206	206	206	207	207	207	206	206	206	206
12.5	202	202	202	203	203	203	203	203	203	203	202	202	202	202	202	203	203	203	203	203	203	203	202	202
15.0	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198
17.5	191	191	191	192	192	192	192	192	192	192	191	191	191	191	191	192	192	192	192	192	192	192	191	191
20.0	181	181	181	181	181	181	180	181	181	181	181	181	181	181	181	181	181	180	181	181	181	181	181	181
22.5	161	160	160	160	160	160	160	160	160	160	160	160	161	160	160	160	160	160	160	160	160	160	160	160
25.0	130	131	131	131	131	131	131	131	131	131	131	131	130	131	131	131	131	131	131	131	131	131	131	131
27.5	103	104	104	104	104	104	103	104	104	104	104	104	103	104	104	104	104	104	103	104	104	104	104	104
30.0	77	77	78	78	78	78	78	78	78	78	78	77	77	77	78	78	78	78	78	78	78	78	78	77
32.5	55	56	56	57	57	57	57	57	57	57	56	56	55	56	56	57	57	57	57	57	57	57	56	56
35.0	48	48	48	49	49	48	48	48	49	49	48	48	48	48	48	49	49	48	48	48	49	49	48	48
37.5	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
40.0	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
42.5	30	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31
45.0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
47.5	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
50.0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
52.5	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
55.0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
57.5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
60.0	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
62.5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
65.0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
67.5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
70.0	2	2	2	3	3	3	2	3	3	3	2	2	2	2	2	3	3	3	2	3	3	3	2	2
72.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
75.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
77.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
87.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90.0	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1	1
92.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
95.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
97.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
100.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
105.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
107.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
110.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
112.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
115.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
117.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
120.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
122.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
125.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
127.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
130.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
132.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
135.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
137.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
140.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
142.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
147.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
150.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
152.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
155.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
157.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

18.11.2019

Test report: TR 2419

Luminaire: Petite 4600

	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345
160.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
162.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
165.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
167.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
170.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
172.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
175.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
177.5	2	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3
180.0	2	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3

Table. Measurement results of the main luminous parameters

Luminous flux	Input power	Luminous efficacy	LOR	DWFF	Luminous intensity (g=0)
212.0 lm	5.30 W	40.0 lm/W	100.0 %	94.6 %	212 cd

Table. Electrical parameters during the light measurements.

	Pin	PF	Vin	If
Value	5.254 W	0.6372	230.0 V	0.0360 A
St.dev.	0.10 %	0.06 %	0.00 %	0.00 %

Table. Maximum luminous intensity and its direction

Iv	g	C plane
212 cd	-0.0 deg	0.0 deg

Table. Beam widths at two perpendicular planes

	Beam angle, FWHM, 50% (deg)	Beam angle, 10% (deg)	Effective beam direction from g=0
C0-180	54.5	92.5	-0.0
C90-270	54.5	92.6	0.0

Figure. Polar curve of the angular luminous intensity distribution at two perpendicular C planes and at C plane with maximum luminous intensity.

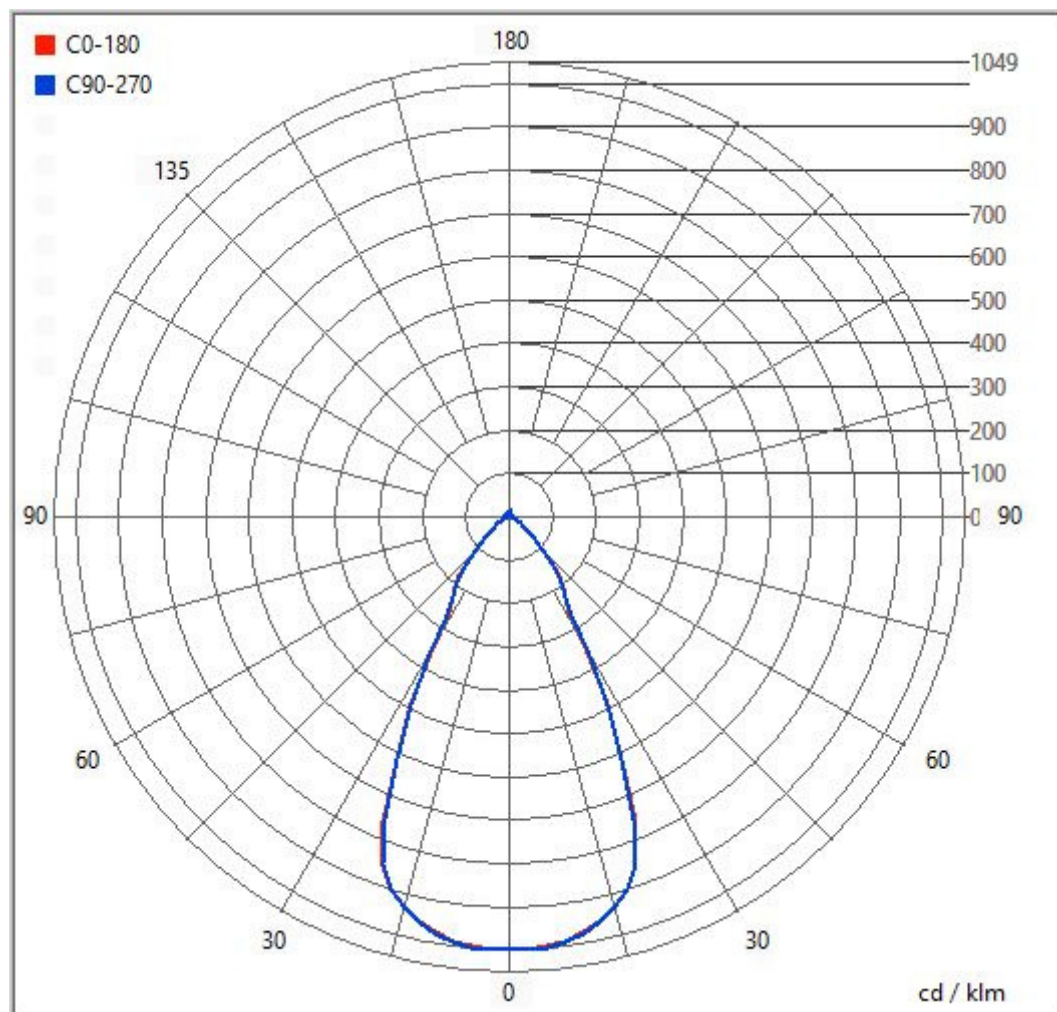


Figure. Luminous intensity distribution in cartesian diagram at all measured C planes

Angular luminous intensity distributions at all C planes

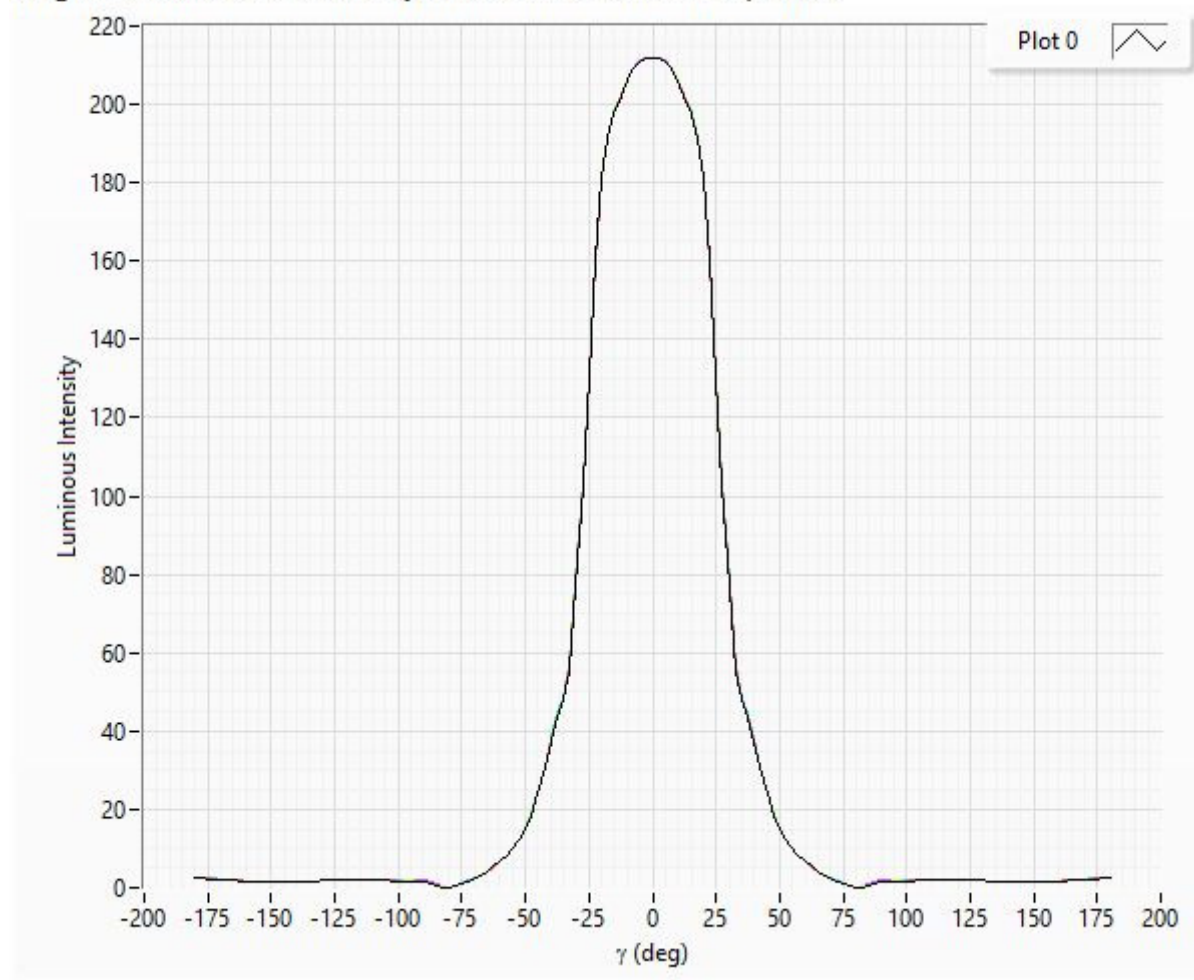


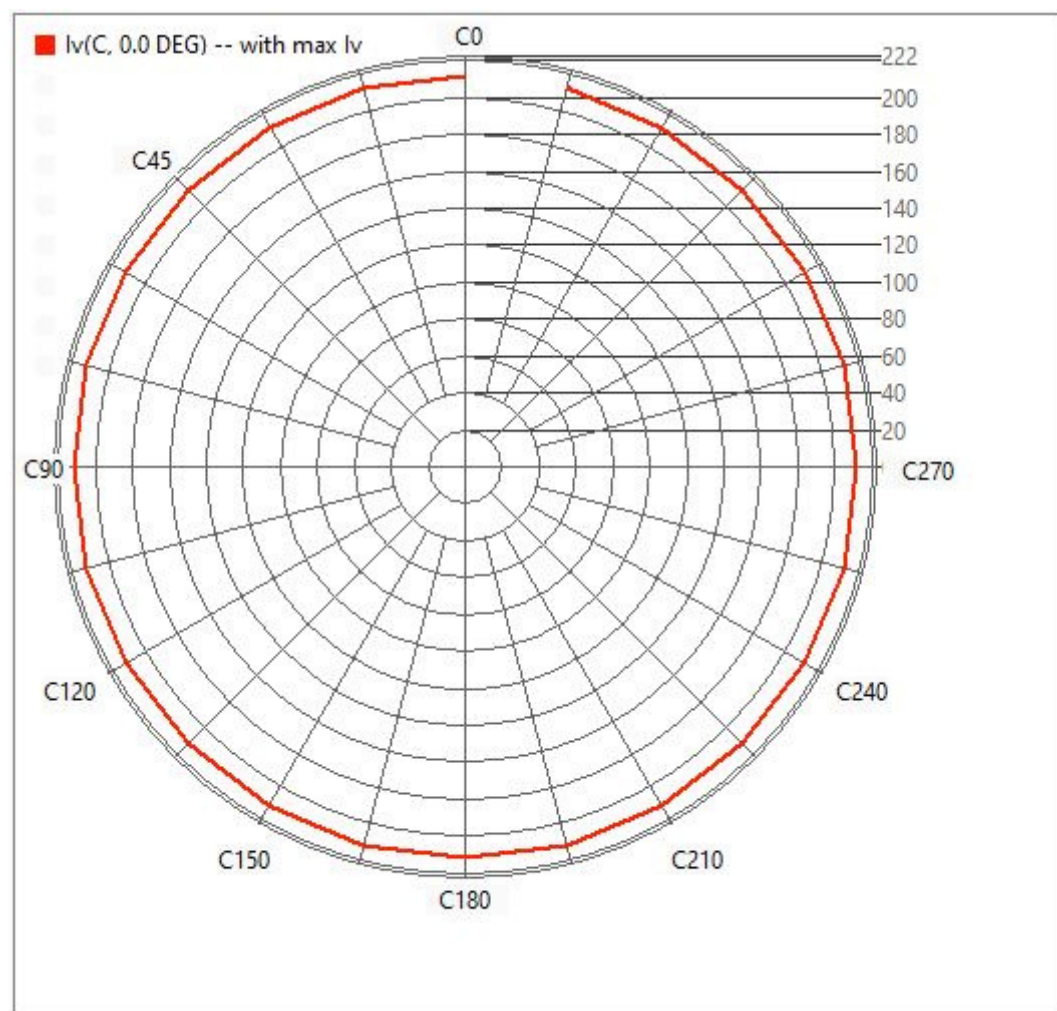
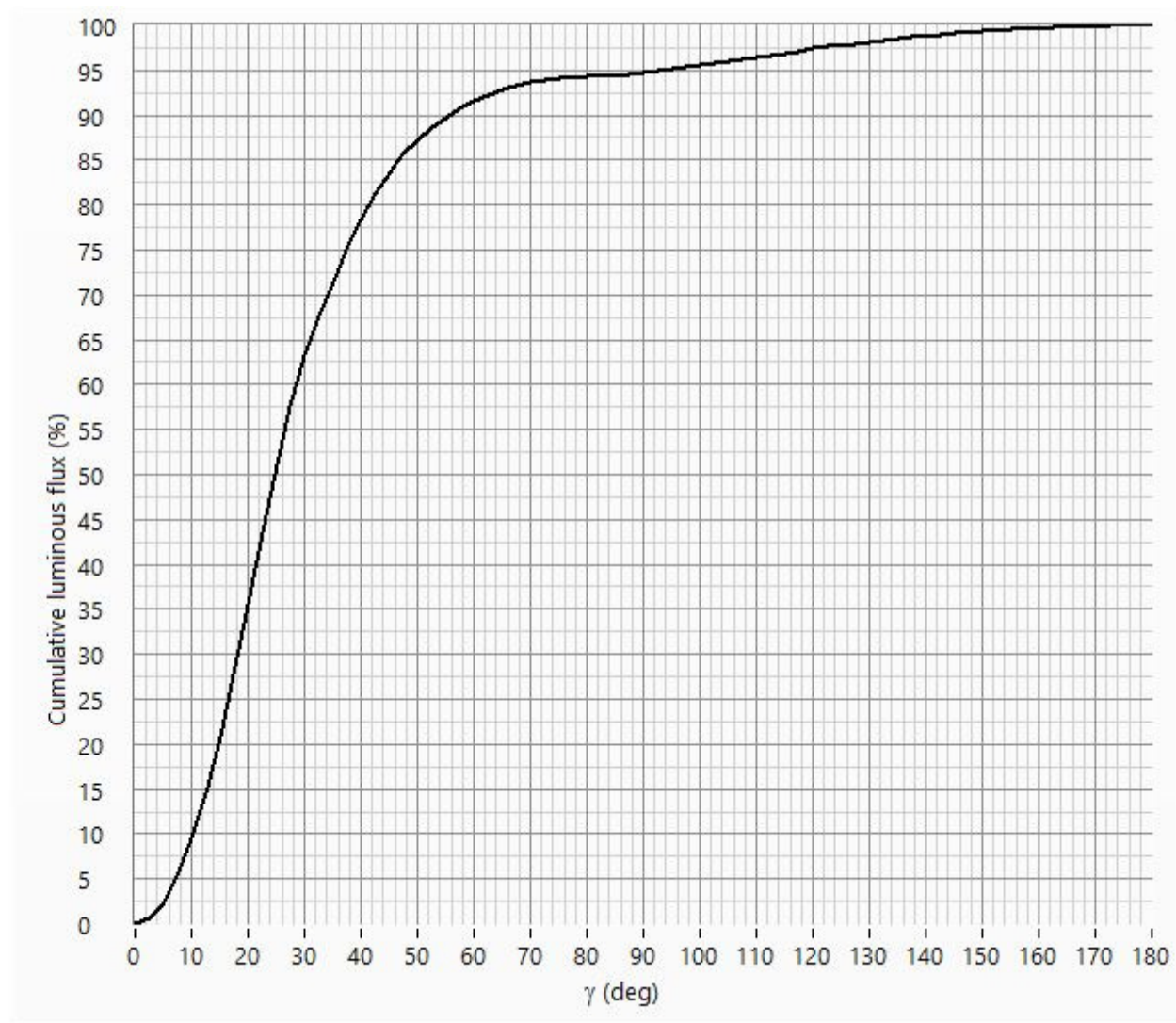
Figure. Isocandela as a function of C plane at gamma angle with maximum luminous intensity

Table. Zonal lumen summary

	Lumens	Relative lumens (%)
0-20	75.20	35.47
0-30	134.10	63.25
0-40	166.00	78.30
0-60	194.30	91.65
0-80	199.90	94.29
0-90	200.70	94.67
10-90	180.70	85.24
20-40	90.80	42.83
20-50	109.80	51.79
40-70	32.60	15.38
40-90	34.70	16.37
60-80	5.60	2.64
60-90	6.40	3.02
70-80	1.30	0.61
80-90	0.80	0.38
90-110	3.90	1.84
90-120	5.80	2.74
90-130	7.40	3.49
90-150	9.80	4.62
90-180	11.30	5.33
110-180	7.40	3.49
0-180	212.00	100.00

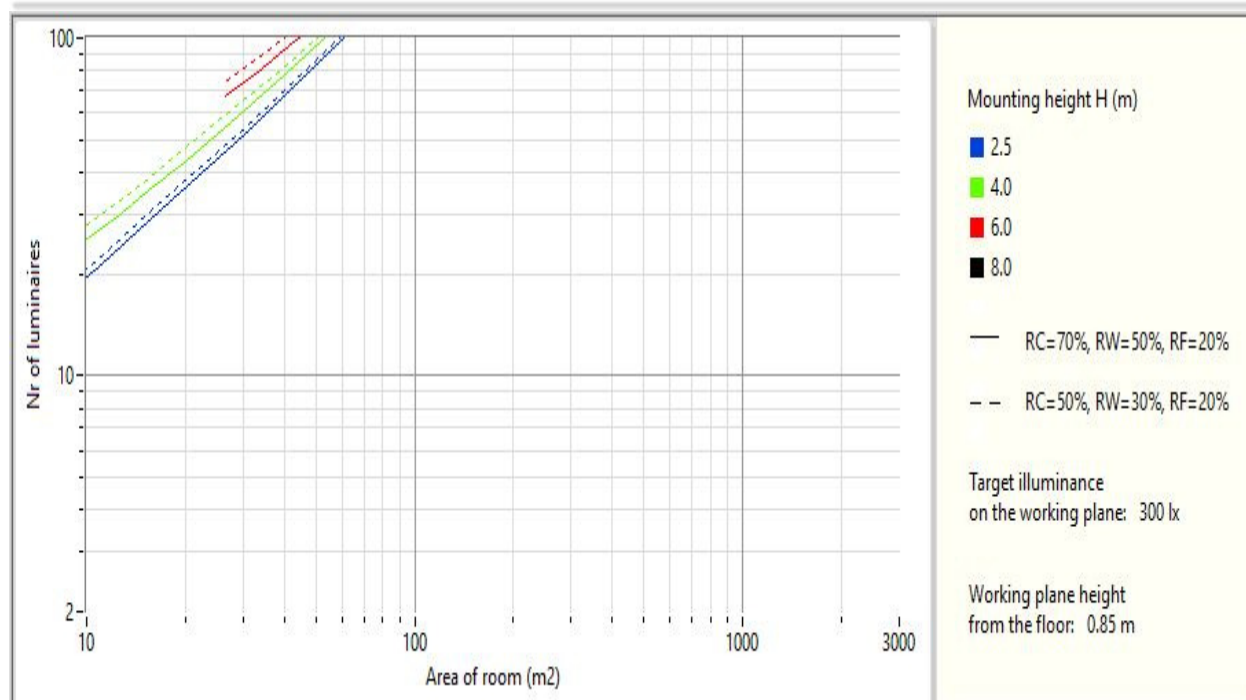
Figure. Cumulative luminous flux

UGR table

Ceiling		70	70	50	50	30		70	70	50	50	30
Walls		50	30	50	30	30		50	30	50	30	30
Floor		20	20	20	20	20		20	20	20	20	20
Room size		Viewing direction at right angles to lamp axis						Viewing direction parallel to lamp axis				
	X Y											
	2H 2H	6.8	7.8	7.2	8.3	8.7		6.8	7.9	7.3	8.3	8.8
	3H	7.2	8.1	7.7	8.5	9.0		7.2	8.1	7.7	8.6	9.1
	4H	7.2	8.0	7.7	8.5	9.0		7.2	8.1	7.7	8.5	9.1
	6H	7.1	7.9	7.6	8.4	8.9		7.1	7.9	7.7	8.4	8.9
	8H	7.0	7.8	7.6	8.3	8.8		7.1	7.8	7.6	8.3	8.9
	12H	7.0	7.7	7.5	8.2	8.8		7.1	7.8	7.6	8.3	8.8
	4H 2H	6.8	7.7	7.3	8.1	8.7		6.9	7.7	7.4	8.2	8.7
	3H	7.3	8.0	7.8	8.5	9.0		7.3	8.0	7.9	8.5	9.1
	4H	7.3	7.9	7.8	8.4	9.0		7.3	8.0	7.9	8.5	9.1
	6H	7.2	7.8	7.8	8.3	8.9		7.3	7.8	7.8	8.4	9.0
	8H	7.2	7.7	7.7	8.2	8.8		7.2	7.7	7.8	8.3	8.9
	12H	7.1	7.6	7.7	8.1	8.8		7.2	7.6	7.8	8.2	8.8
	8H 4H	7.2	7.7	7.8	8.2	8.8		7.2	7.7	7.8	8.3	8.9
	6H	7.1	7.5	7.7	8.1	8.7		7.1	7.5	7.7	8.1	8.8
	8H	7.0	7.4	7.7	8.0	8.6		7.1	7.5	7.7	8.1	8.7
	12H	7.0	7.3	7.6	7.9	8.6		7.1	7.4	7.7	8.0	8.7
	12H 4H	7.1	7.6	7.7	8.1	8.7		7.2	7.6	7.8	8.2	8.8
	6H	7.0	7.4	7.7	8.0	8.6		7.1	7.4	7.7	8.0	8.7
	8H	7.0	7.3	7.6	7.9	8.6		7.0	7.4	7.7	8.0	8.7

CU table

RC	80				70				50			30			10		
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
RF / RCR	20				20				20			20			20		
0	118	118	118	118	114	114	114	114	108	108	108	102	102	102	97	97	97
1	91	89	87	85	92	90	88	87	92	90	89	94	93	91	96	94	93
2	89	85	82	79	90	86	83	80	87	84	82	88	86	84	89	87	85
3	87	81	77	74	87	82	78	74	82	79	76	83	80	77	84	81	78
4	84	77	72	69	83	77	73	69	78	73	70	78	74	71	78	75	72
5	80	73	68	64	80	73	68	65	73	69	65	73	69	66	73	70	67
6	77	69	64	60	77	69	64	60	69	64	61	69	65	61	69	65	62
7	74	66	60	56	73	66	60	57	65	60	57	65	61	57	65	61	58
8	71	62	57	53	70	62	57	53	62	57	53	62	57	54	61	57	54
9	68	59	54	50	67	59	54	50	59	54	50	58	54	51	58	54	51
10	65	56	51	47	65	56	51	47	56	51	47	55	51	48	55	51	48



WEC table

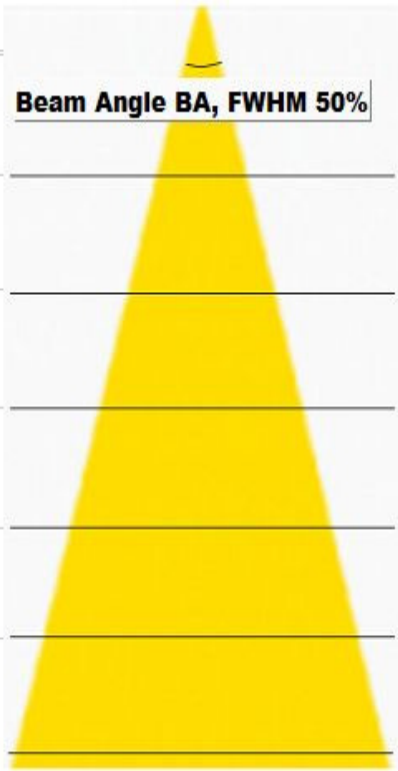
RC	80				70				50			30			10		
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
RF / RCR	20				20				20			20			20		
1	30.5	20.7	11.8	3.8	29.2	19.9	11.4	3.6	18.3	10.5	3.4	16.6	9.6	3.1	14.9	8.6	2.8
2	30.4	19.9	11.0	3.4	29.1	19.1	10.6	3.3	17.7	9.9	3.1	16.2	9.1	2.9	14.6	8.3	2.6
3	30.0	18.9	10.2	3.1	28.7	18.3	9.9	3.0	16.9	9.3	2.8	15.6	8.6	2.7	14.2	7.9	2.4
4	29.3	18.1	9.6	2.9	28.1	17.5	9.3	2.8	16.2	8.7	2.6	15.0	8.1	2.5	13.7	7.4	2.3
5	28.7	17.2	9.0	2.7	27.5	16.7	8.7	2.6	15.5	8.2	2.5	14.4	7.6	2.3	13.1	7.0	2.1
6	28.0	16.5	8.5	2.5	26.8	16.0	8.3	2.4	14.9	7.8	2.3	13.8	7.2	2.2	12.6	6.7	2.0
7	27.2	15.8	8.1	2.4	26.2	15.3	7.9	2.3	14.3	7.4	2.2	13.2	6.9	2.0	12.1	6.3	1.9
8	26.5	15.2	7.7	2.3	25.5	14.7	7.5	2.2	13.7	7.0	2.1	12.7	6.5	1.9	11.7	6.0	1.8
9	25.9	14.6	7.4	2.2	24.8	14.2	7.2	2.1	13.2	6.7	2.0	12.2	6.2	1.8	11.2	5.7	1.7
10	25.2	14.1	7.1	2.1	24.2	13.7	6.9	2.0	12.7	6.5	1.9	11.8	6.0	1.7	10.8	5.5	1.6

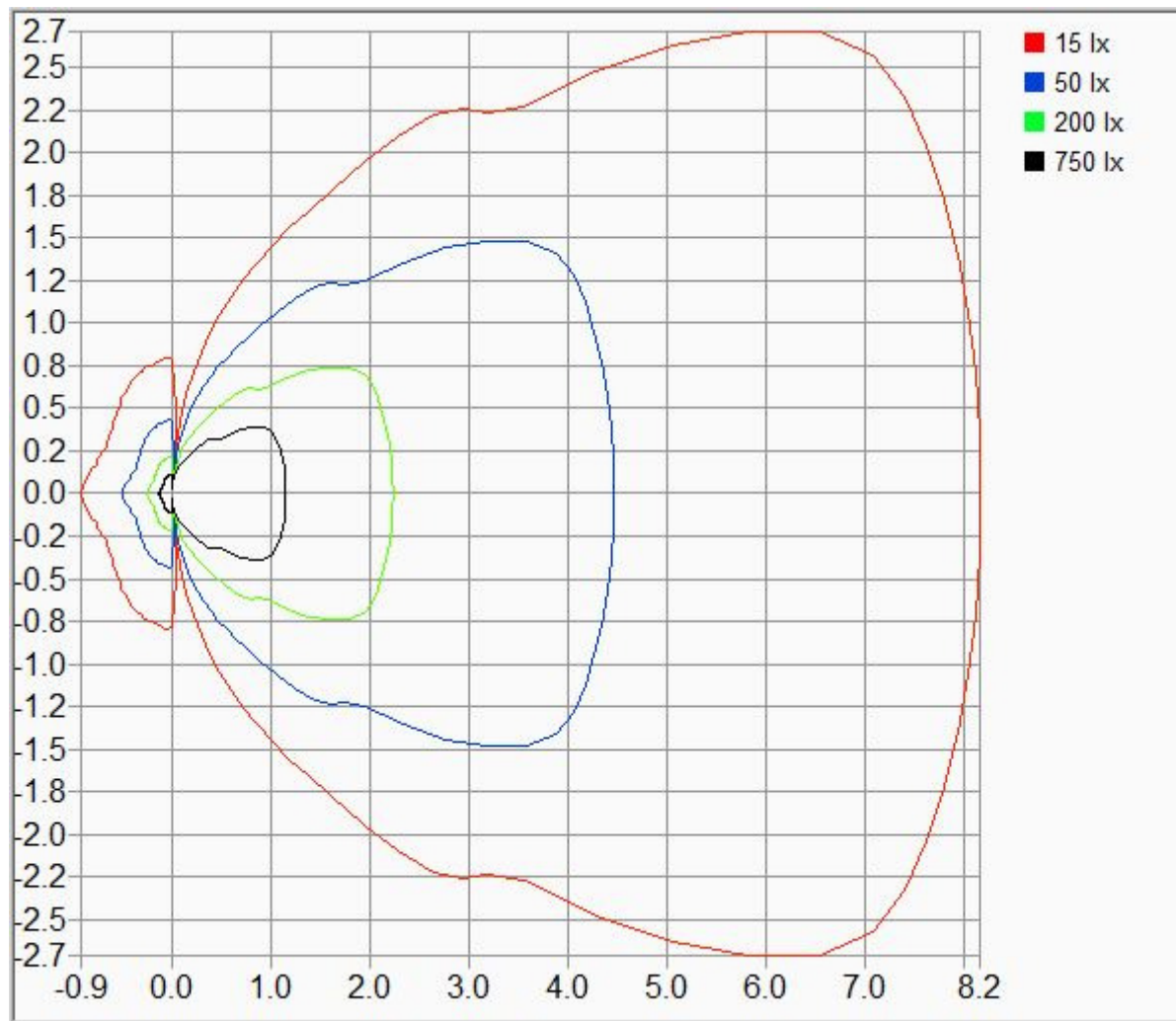
CCEC table

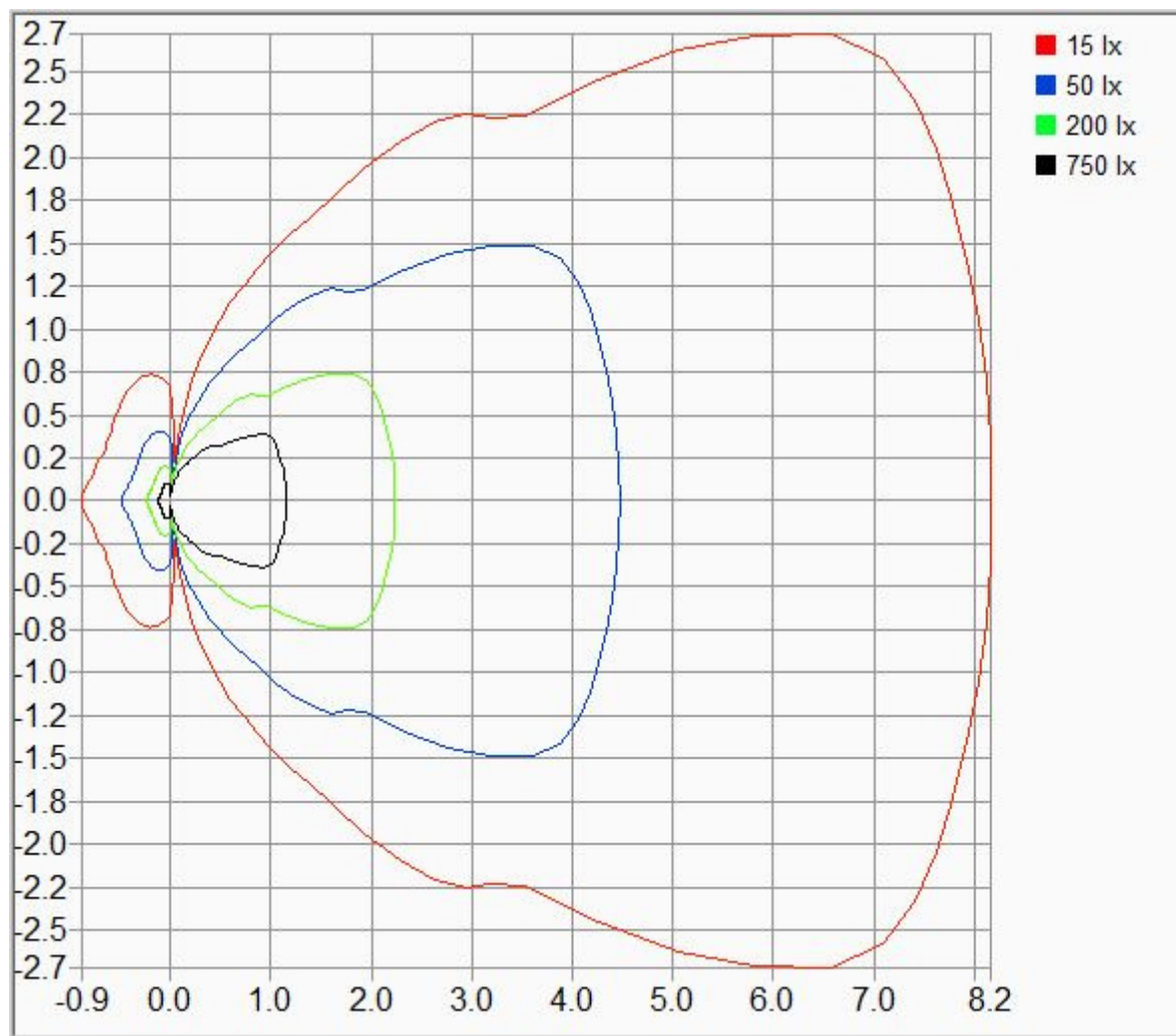
RC	80				70				50			30			10		
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
RF / RCR	20				20				20			20			20		
1	68.9	64.1	59.8	55.9	31.4	29.0	26.8	24.8	12.3	11.3	10.4	6.2	5.8	5.3	1.9	1.8	1.7
2	67.0	58.2	51.0	44.9	30.8	26.3	22.6	19.4	11.2	9.5	8.1	5.8	4.9	4.2	1.8	1.6	1.4
3	64.6	52.8	43.6	36.3	30.0	23.9	19.1	15.3	10.3	8.1	6.3	5.3	4.3	3.4	1.7	1.4	1.1
4	62.0	47.8	37.4	29.4	29.1	21.7	16.2	12.0	9.5	7.0	5.0	5.0	3.7	2.7	1.6	1.2	0.9
5	59.2	43.1	31.9	23.7	28.1	19.7	13.8	9.3	8.8	6.0	3.9	4.7	3.3	2.2	1.5	1.1	0.8
6	56.2	38.9	27.2	18.8	27.0	17.9	11.6	7.1	8.2	5.2	3.0	4.4	2.9	1.8	1.4	1.0	0.6
7	53.3	34.9	23.1	14.7	25.8	16.2	9.8	5.3	7.6	4.5	2.3	4.1	2.6	1.5	1.3	0.9	0.6
8	50.4	31.4	19.4	11.3	24.7	14.6	8.2	3.7	7.0	3.9	1.7	3.9	2.3	1.2	1.3	0.8	0.5
9	47.5	28.1	16.3	8.2	23.5	13.2	6.8	2.4	6.5	3.4	1.2	3.7	2.1	1.0	1.2	0.8	0.4
10	44.8	25.2	13.5	5.7	22.4	11.9	5.5	1.2	6.0	2.9	0.8	3.5	1.9	0.8	1.2	0.7	0.4

CONE DIAGRAM

- Cone is limited by the beam angle at the planes of C0 and C90
- H = Mounting Height
- D = Cone diameter
- Ev Edge = illuminance at the edge of the cone of the C0/90 plane
- Ev Center = illuminance at the center of the cone

H (m)		D (m) C0-180	D (m) C90-270	Ev (lx) Center	Ev (lx) Edge, C0-180	Ev (lx) Edge, C90-270
1.0		1.0	1.0	212	74	74
2.0		2.1	2.1	53	19	19
2.5		2.6	2.6	34	12	12
3.0		3.1	3.1	24	8.3	8.3
4.0		4.1	4.1	13	4.7	4.6
5.0		5.1	5.2	8.5	3.0	3.0

Vertical isolux

Horizontal isolux

Floor illuminance figures. Mounting height of 2.5 m. C rotation of 0.0 deg. Gamma rotation of 0.0 deg. Maintenance factor = 0.80.

