
MEASUREMENT REPORT

Nr	M-R xxxx	
Report version	v1.0	
Customer	Company Oy	
Luminaire under test	Sample luminaire	
Measured quantities	Luminous flux, Luminous efficacy, Angular luminous intensity distribution, Cumulative luminous flux, UGR table, Cone diagram, Floor illuminance.	
Measurement date	31.8.2015	
Date	20.4.2018	
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Distribution	Customer SSL Resource Oy	

MEASUREMENT METHOD

The measurements were made by a goniophotometer at the dark room of SSL Resource Oy. The luminous intensities of a light source at different directions were measured with a calibrated photometer located at a known distance from the light source. The measurement procedure is accordance with EN 13032.

Table 1. List of the used measurement quantities.

Quantity	Symbol
Luminous flux	Φ_V
Luminous efficacy	η_V
Input power	P_{IN}
Beam-angle, 50% from the peak intensity	BA_{50}
Beam-angle, 10% from the peak intensity	BA_{10}
Downward flux fraction ($\gamma < 90^\circ$)	DWFF
Luminous intensity (γ, C)=($0^\circ, 0^\circ$)	I_V

MEASUREMENT UNCERTAINTY

The photometer (measurement electronics L200-003, measuring head LH200-004) used in goniophotometer is traceable to national standard of illuminance responsivity at VTT-MIKES (Certificate of calibration T-R 1025 signed on 8 February 2018). The power meter of type Chroma 66201-30000266 is traceable national standard of electrical parameters at NIST (Calibration date 6 September 2016). The expanded measurement uncertainties of the luminous flux and luminous efficacy are $\pm 3.8\%$ and $\pm 4.0\%$ ($k = 2$), respectively.

MEASUREMENTS

Table 1 describes the measurement conditions. The luminaire under test and photometer were mounted onto the same optical axis and perpendicular by an alignment laser and auxiliary mirror. The measurement distance from the rotation axis to the photometer optical receiving surface was measured by laser distance meter and a caliper.

Table 2. Measurement information.

Parameter	Value
Ambient temperature of the laboratory	$(24.2 \pm 1)^\circ\text{C}$
Supply voltage	$(230.0 \pm 0.3) \text{ V}$
Measurement distance	11.988 m
Location of the rotation axis (behind the outermost surface of the optics)	10 mm
γ_{\max}	150°
γ_{step}	2.5°
C_{step}	15°
Stabilization time	60 min

RESULTS

The measurement results are shown in table 3 and in figures 1-7.

Table 3. The measurement results of luminous intensity distribution.

Φ_V	P_{IN}	η_V	DWFF	$BA_{50,}$		I_V	$I_{V,max}$	(γ_{max}, C_{max})
				C0-180 / 90-270	C0-180 / 90-270			
3310 lm	27.5 W	120 lm/W	96.3 %	114° / 99°	186° / 152°	1129 cd	1129 cd	(0°, 0°)

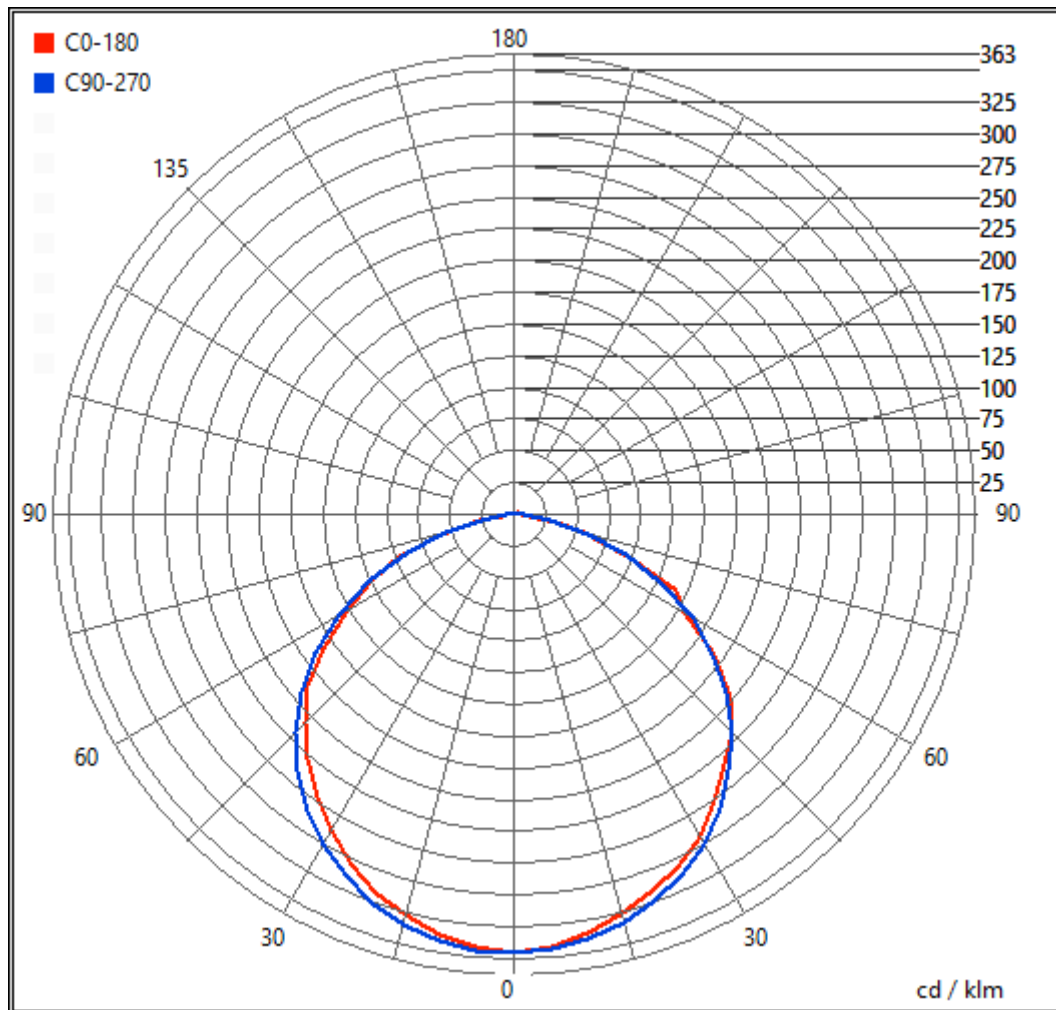


Figure 1. Polar curve.

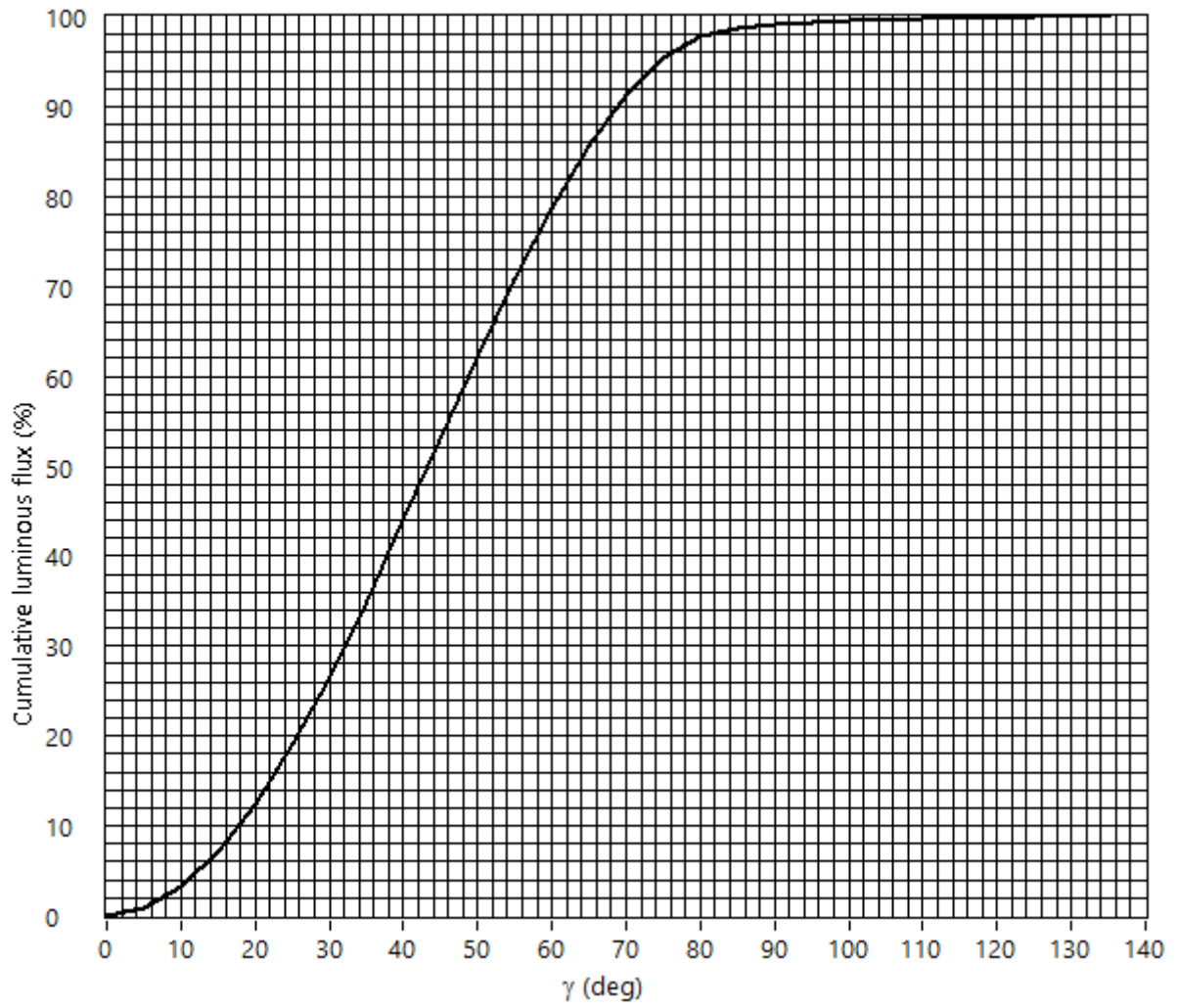


Figure 3. Cumulative luminous flux.

Glare Evaluation According to UGR												
ρ Ceiling		70	70	50	50	30	70	70	50	50	30	
ρ Walls		50	30	50	30	30	50	30	50	30	30	
ρ Floor		20	20	20	20	20	20	20	20	20	20	
Room Size X Y		Viewing direction at right angles to lamp axis					Viewing direction parallel to lamp axis					
2H	2H	20.1	21.4	20.4	21.7	22.0	19.3	20.6	19.7	20.9	21.2	
	3H	21.7	22.9	22.1	23.2	23.5	20.4	21.5	20.7	21.9	22.2	
	4H	22.4	23.5	22.8	23.9	24.3	20.7	21.8	21.1	22.2	22.5	
	6H	23.1	24.2	23.5	24.5	24.9	20.9	21.9	21.3	22.3	22.7	
	8H	23.4	24.4	23.9	24.8	25.2	21.0	22.0	21.4	22.3	22.7	
	12H	23.7	24.7	24.2	25.1	25.5	21.0	21.9	21.4	22.3	22.7	
4H	2H	20.7	21.8	21.1	22.1	22.5	20.0	21.2	20.4	21.5	21.9	
	3H	22.5	23.5	22.9	23.9	24.3	21.3	22.3	21.8	22.7	23.1	
	4H	23.4	24.3	23.9	24.7	25.1	21.8	22.7	22.3	23.1	23.6	
	6H	24.3	25.0	24.8	25.5	25.9	22.2	22.9	22.6	23.4	23.8	
	8H	24.7	25.4	25.2	25.8	26.3	22.2	22.9	22.7	23.4	23.9	
	12H	25.1	25.7	25.6	26.2	26.7	22.3	22.9	22.8	23.4	23.9	
8H	4H	23.7	24.4	24.2	24.9	25.4	22.4	23.0	22.8	23.5	24.0	
	6H	24.8	25.4	25.3	25.9	26.4	22.9	23.5	23.4	24.0	24.5	
	8H	25.3	25.8	25.9	26.3	26.9	23.1	23.6	23.6	24.1	24.7	
	12H	25.9	26.3	26.4	26.8	27.4	23.2	23.6	23.7	24.2	24.7	
12H	4H	23.7	24.4	24.2	24.8	25.3	22.4	23.1	23.0	23.6	24.1	
	6H	24.9	25.4	25.4	25.9	26.4	23.1	23.6	23.6	24.1	24.7	
	8H	25.5	25.9	26.0	26.4	27.0	23.4	23.8	23.9	24.3	24.9	
Variation of the observer position for the luminaire distance S												
S = 1.0H		+0.1 / -0.1					+0.1 / -0.1					
S = 1.5H		+0.2 / -0.3					+0.3 / -0.5					
S = 2.0H		+0.3 / -0.6					+0.5 / -0.9					
Standard table		BK07					BK05					
Correction Summand		8.4					5.7					
Corrected Glare Indices referring to 3310lm Total Luminous Flux												

Figure 5. UGR table.

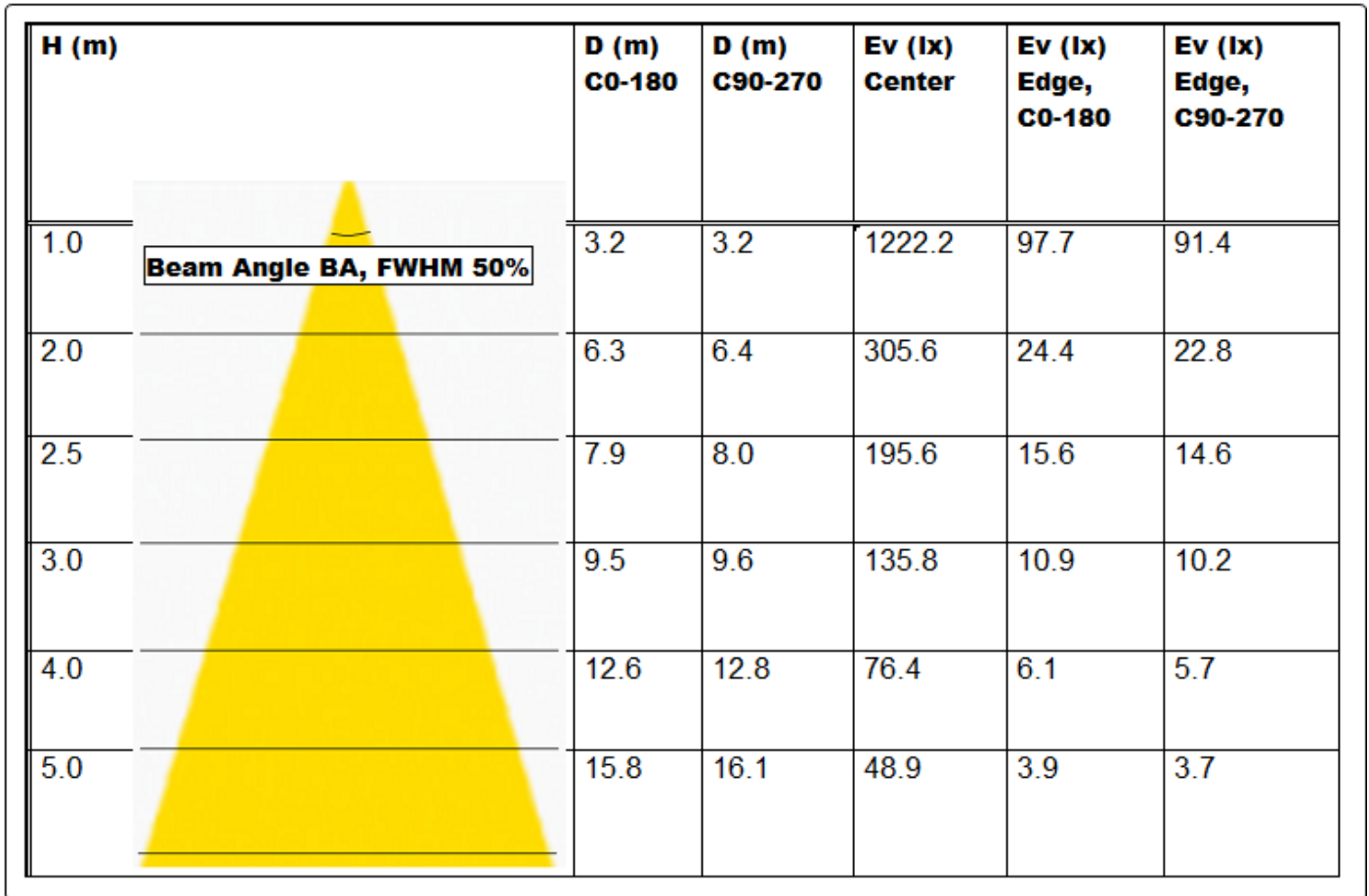


Figure 6. Cone diagram.

Floor illuminance figures at mounting height of 3.0 meters with C rotation of 0.0 degrees and with gamma rotation of 0.0 degrees. Degradation factor of installation was 0.80.

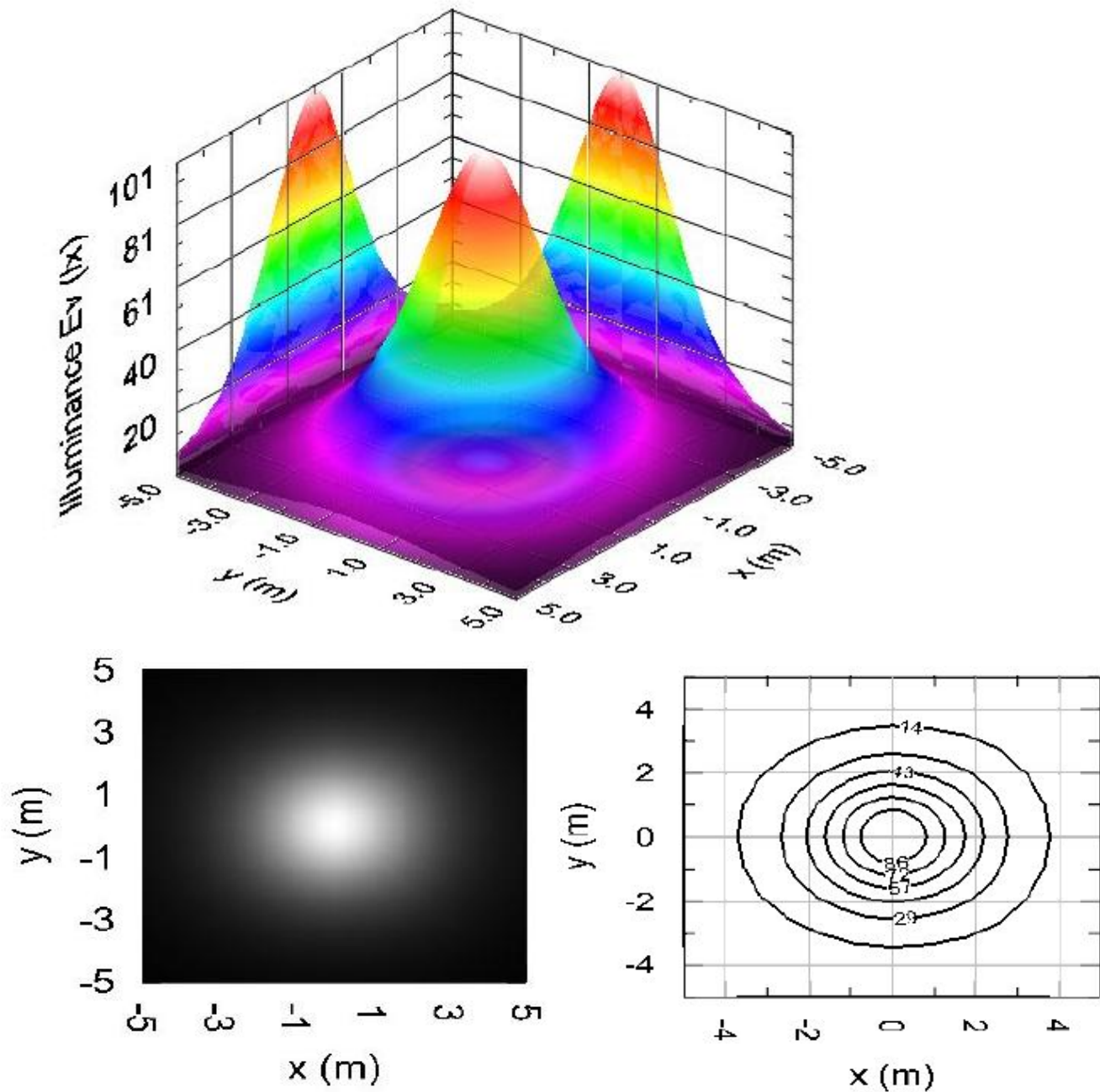


Figure 7. Floor illuminance.

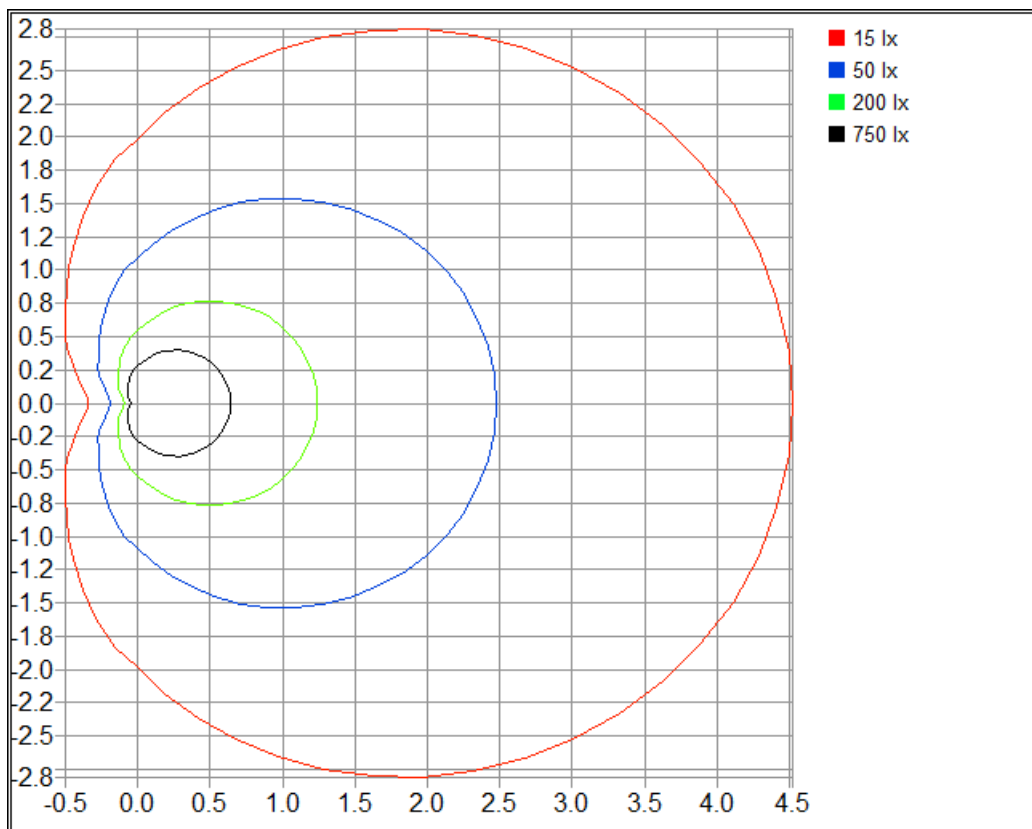


Figure 8. Isolux –horizontal plane.

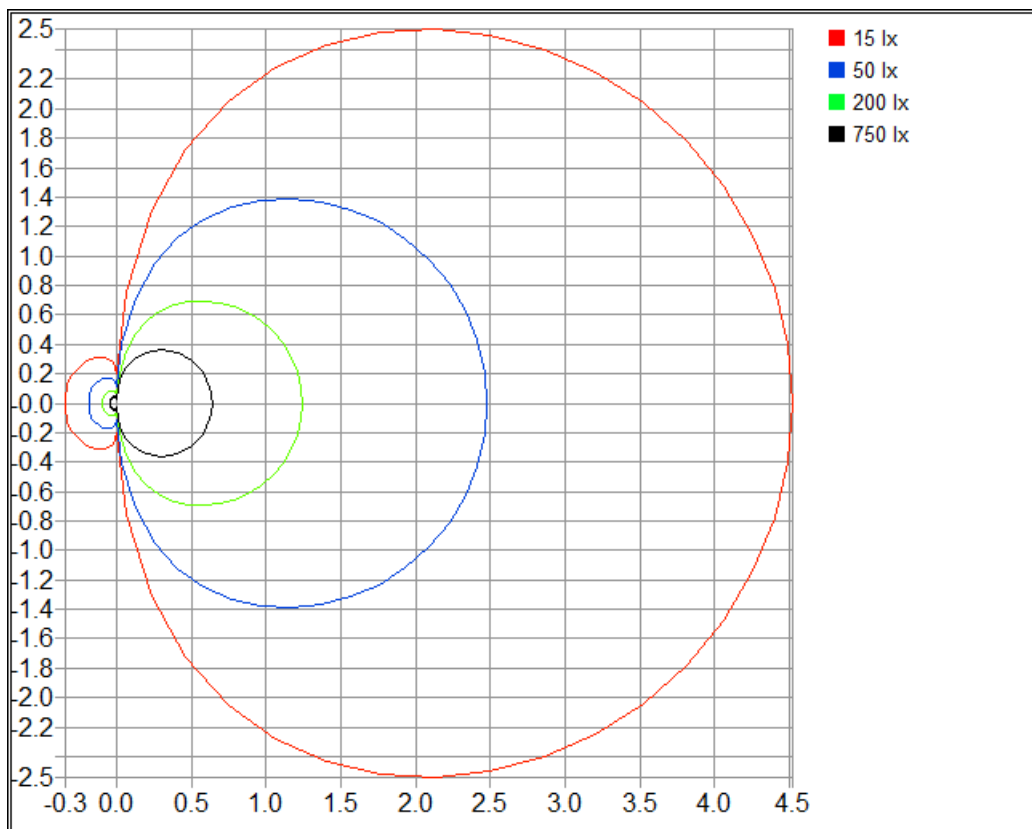


Figure 9. Isolux –vertical plane.