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# MEASUREMENT REPORT

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Nr	TR 1187
Report version	1.0
Customer	Secto Design Oy Kauppalaantie 12 02700 Kauniainen
Luminaire under test	Owalo 7010 Floor lamp 10W
Measured quantities	Luminous flux, Luminous efficacy, Angular luminous intensity distribution, Cumulative luminous flux, UGR table, floor illuminance.
Measurement date	27.5.2016
Date	30.5.2016
Signatures	Dr. Pasi Manninen Specialist
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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. Dark current of the measurement setup with the lamp under study was measured and subtracted from the measured luminous intensities. The measurements were made in accordance with IES LM-79-08 standard.

Table 1. List of the used measurement quantities.

Quantity	Symbol
Luminous flux	$\Phi_V$
Luminous efficacy	$\eta_V$
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 ( $\gamma, C$ )=( $0^\circ, 0^\circ$ )	$I_V$

## MEASUREMENT UNCERTAINTY

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 1. Measurement information.**

Parameter	Value
Ambient temperature of the laboratory	$(24.5 \pm 1)^{\circ}\text{C}$
Supply voltage	$(230.0 \pm 0.3) \text{ V}$
Measurement distance	7.980 m
Location of the rotation axis (behind the outermost surface of the optics)	150 mm
$\gamma_{\text{max}}$	$145^{\circ}$
$\gamma_{\text{step}}$	$2.5^{\circ}$
$C_{\text{step}}$	$15^{\circ}$
Stabilization time	90 min

## RESULTS

The measurement results are shown in table 2 and in figure 1-5.

Table 2. The luminous efficiency results.

$\Phi_V$ (lm)	$P_{IN}$ (W)	$\eta_V$ (lm/W)	DWFF	BA <sub>50</sub> ,	BA <sub>10</sub> ,	$I_V$ (cd)
				C0-180 / C90-270	C0-180 / C90-270	
210	8.9	23.6	88.3%	23° / 70°	164° / 101°	204

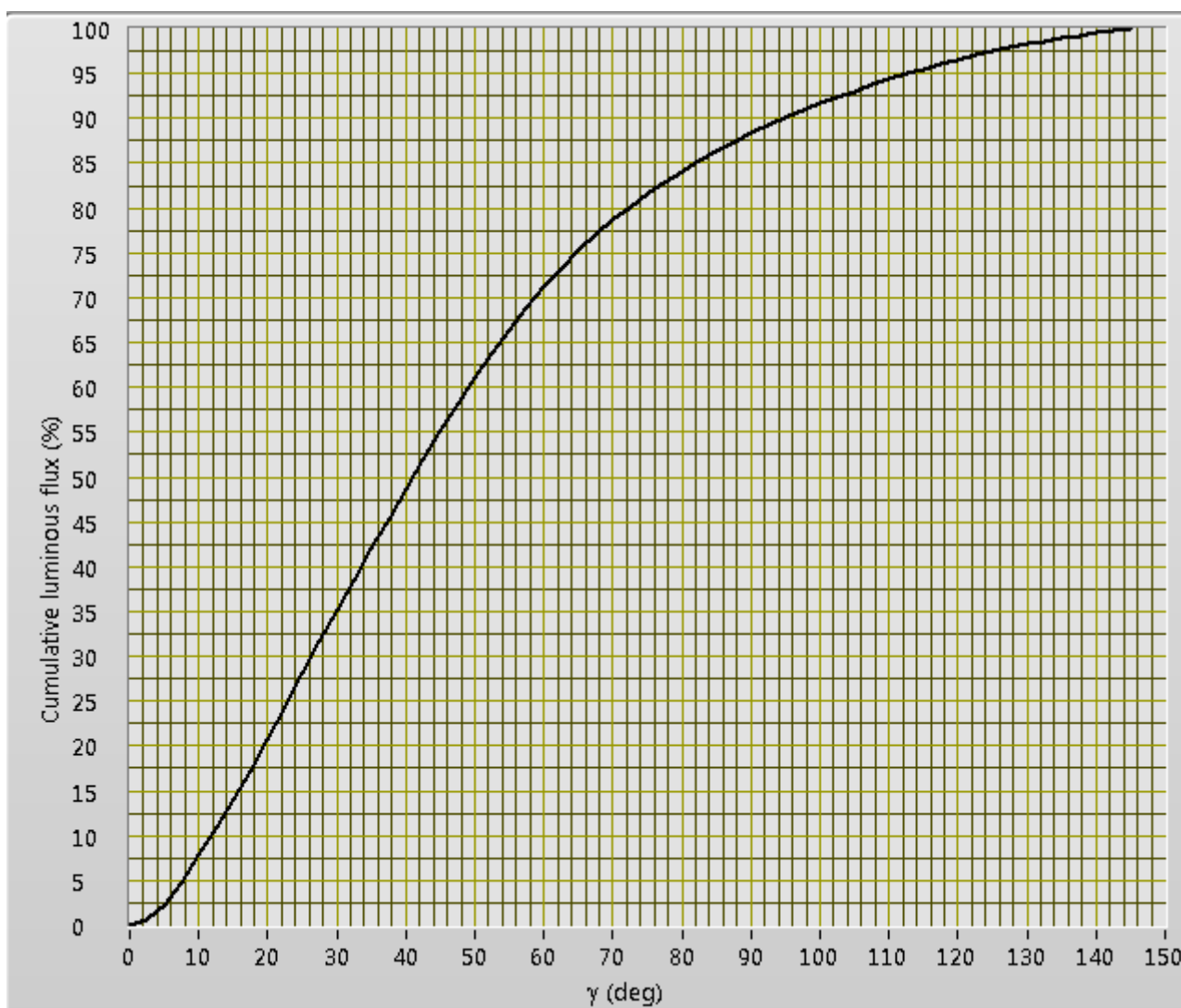


Figure 1. Cumulative luminous flux.

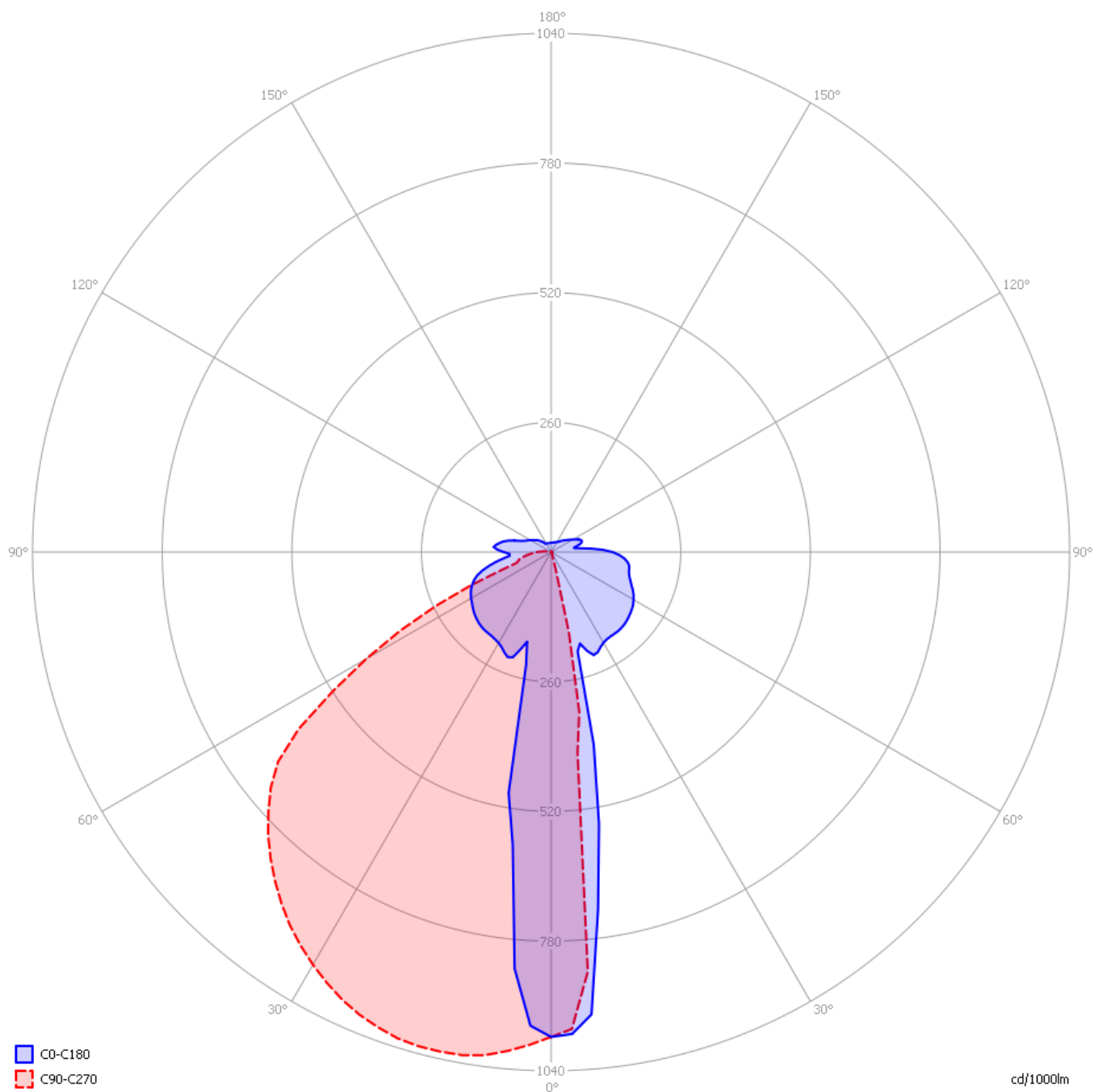


Figure 2. Polar curve.

Glare Evaluation According to UGR											
$\rho$ Ceiling		70	70	50	50	30	70	70	50	50	30
$\rho$ Walls		50	30	50	30	30	50	30	50	30	30
$\rho$ 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	18.9	19.9	19.3	20.4	20.8	20.0	21.1	20.4	21.5	21.9
	3H	21.4	22.3	21.9	22.8	23.3	20.7	21.7	21.2	22.1	22.6
	4H	22.7	23.6	23.2	24.1	24.6	20.9	21.8	21.4	22.3	22.8
	6H	24.0	24.8	24.5	25.3	25.8	21.1	22.0	21.6	22.5	23.0
	8H	24.6	25.4	25.1	25.9	26.4	21.2	22.0	21.8	22.6	23.1
	12H	25.1	25.9	25.7	26.4	27.0	21.3	22.1	21.9	22.6	23.2
4H	2H	18.8	19.7	19.3	20.2	20.7	19.8	20.8	20.3	21.2	21.8
	3H	21.3	22.1	21.9	22.6	23.2	20.6	21.4	21.2	21.9	22.5
	4H	22.8	23.4	23.3	24.0	24.6	20.9	21.6	21.5	22.1	22.7
	6H	24.3	24.9	24.8	25.4	26.1	21.2	21.8	21.8	22.4	23.0
	8H	25.0	25.6	25.6	26.2	26.8	21.4	22.0	22.0	22.6	23.2
	12H	25.8	26.3	26.4	26.9	27.6	21.6	22.1	22.2	22.7	23.4
8H	4H	22.7	23.2	23.3	23.8	24.5	20.9	21.5	21.5	22.0	22.7
	6H	24.3	24.7	24.9	25.3	26.0	21.3	21.8	21.9	22.4	23.1
	8H	25.1	25.5	25.8	26.1	26.9	21.5	21.9	22.2	22.6	23.3
	12H	26.0	26.4	26.7	27.0	27.8	21.8	22.2	22.5	22.8	23.6
12H	4H	22.6	23.2	23.3	23.8	24.4	20.9	21.4	21.5	22.0	22.7
	6H	24.2	24.6	24.9	25.3	26.0	21.3	21.7	22.0	22.4	23.1
	8H	25.1	25.4	25.8	26.1	26.8	21.6	21.9	22.3	22.6	23.3
Variation of the observerposition for the luminaire distance S											
S = 1.0H		+0.2 / -0.2					+0.9 / -1.4				
S = 1.5H		+0.5 / -0.5					+2.4 / -2.0				
S = 2.0H		+1.0 / -1.1					+3.9 / -2.5				
Standard table		---					BK03				
Correction Summand		---					4.5				
Corrected Glare Indices referring to 210lm Total Luminous Flux											

Figure 3. UGR table – calculated using quadrantly symmetrized data.

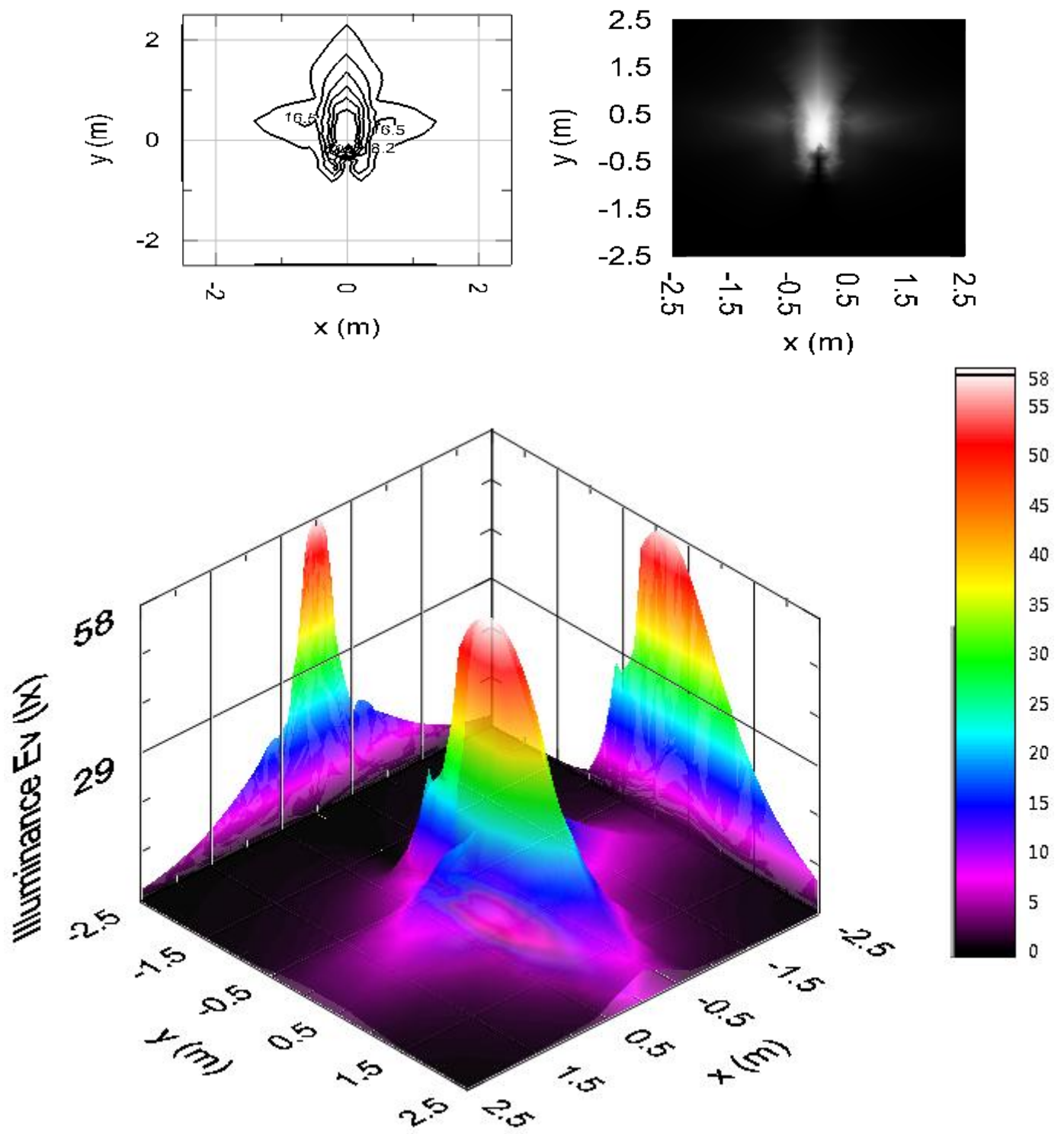


Figure 4. Floor illuminance at mounting height of 1.7 meters. The ageing degradation factor of the installation was 0.8.