MEASUREMENT REPORT

Nr	T-R 1433
Report version	v1.0
Customer	Karlux Oy Lakkilantie 6, 15150 Lahti
Luminaire under test	Lahti led tieoptiikka
Measured quantities	Luminous flux, luminous efficacy, Luminous intensity distribution, Floor illuminance
Measurement date	13.4.2017
Date	20.4.2017
Signatures	Dr. Pasi Manninen CEO, Head of Light Lab Mr. Joni Riipinen Photometric Lab Technician
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Distribution	Customer SSL Resource Oy

SSL RESOURCE

SSL Resource Oy BIC 2564437-1
✉ Vesalantie 6, FI-24910 Halikko As, FINLAND
☎ +358-44-360 8199 @ info@sslresource.com

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.

Table 1. List of the used measurement quantities.

Quantity	Symbol
Luminous flux	Φ_V
Luminous efficacy	η_V
Input power	P_{IN}
Power factor	PF
Luminous intensity (γ,C)=(0°,0°)	I_V
Maximum luminous intensity	$I_{V,\,max}$
The direction of the maximum luminous intensity $I_{V,\,max}$	(γ_{max}, C_{max})
Beam-angle, 50% from the peak intensity	BA_{50}
Beam-angle, 10% from the peak intensity	BA_{10}
Downward flux fraction (γ < 90°)	DWFF

MEASUREMENT UNCERTAINTY

The expanded measurement uncertainties of the luminous flux and luminous efficacy are ±3.8% and ±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 ± 1)°C
Supply voltage	(230.0 ± 0.3) V
Measurement distance	7.752 m
Location of the rotation axis (behind the outermost surface of the optics)	0 mm
γ_{max}	90°
γ_{step}	2.5°
C_{step}	5°
Stabilization time	60 min

RESULTS

The measurement results are shown in tables 2 and in figures 1-2.

The transversal isolux curves are presented in figures on pages 5-8. The isolux curves was presented for mounting heights of 3, 4, 5, and 6 meters. The ageing degradation factor of the installation was 0.8.

Table 2. The measurement results of luminous intensity distribution.

Φ_V (lm)	P_{IN} (W)	η_V (lm/W)	I_V (cd)	$I_{V,max}$ (cd)	(γ_{max}, C_{max})	DWFF	BA_{50}, C0-180 / C90-270	BA_{10}, C0-180 / C90-270
3171.6	43.9	72.2	959	1845 cd	(67,5°, 20°)	100 %	146° / 64°	153° / 146°

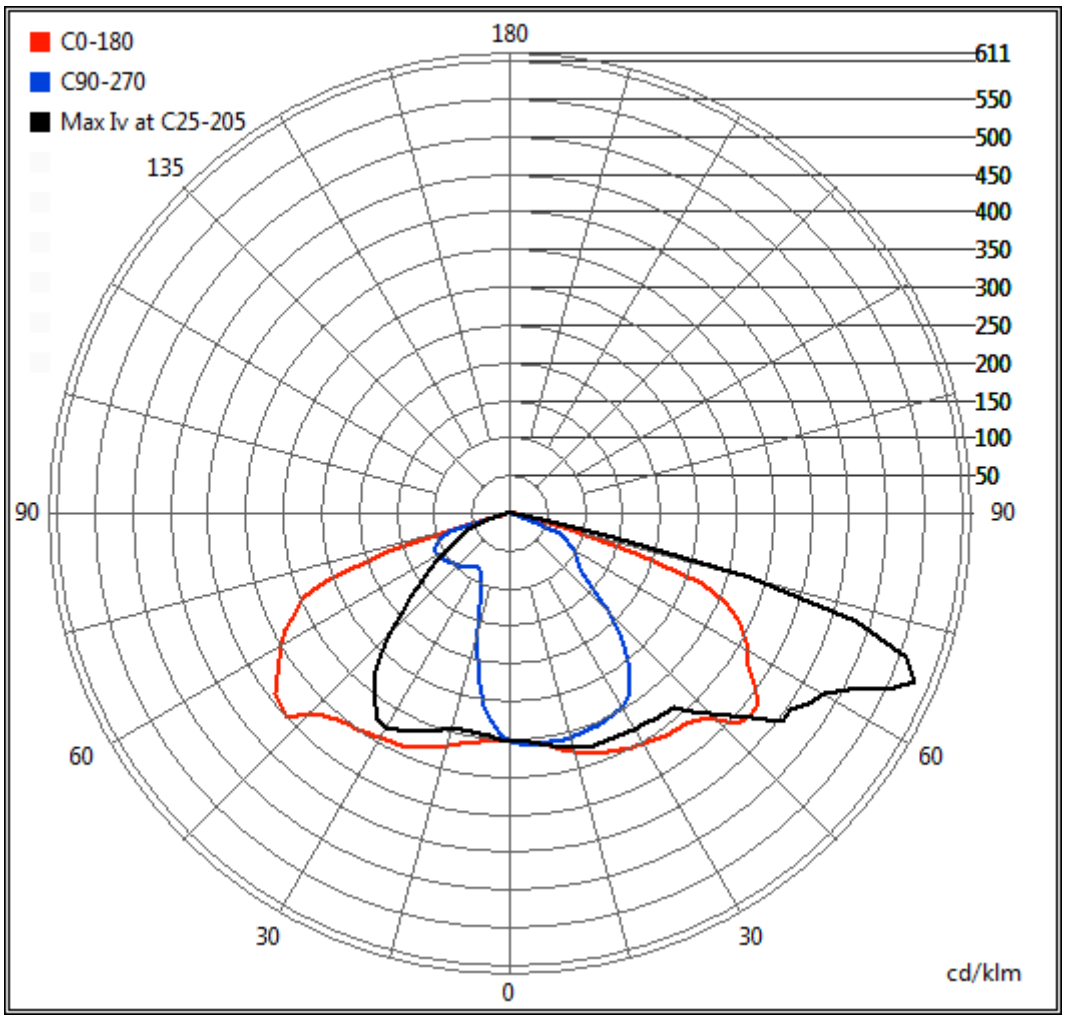


Figure 1. Polar curve.

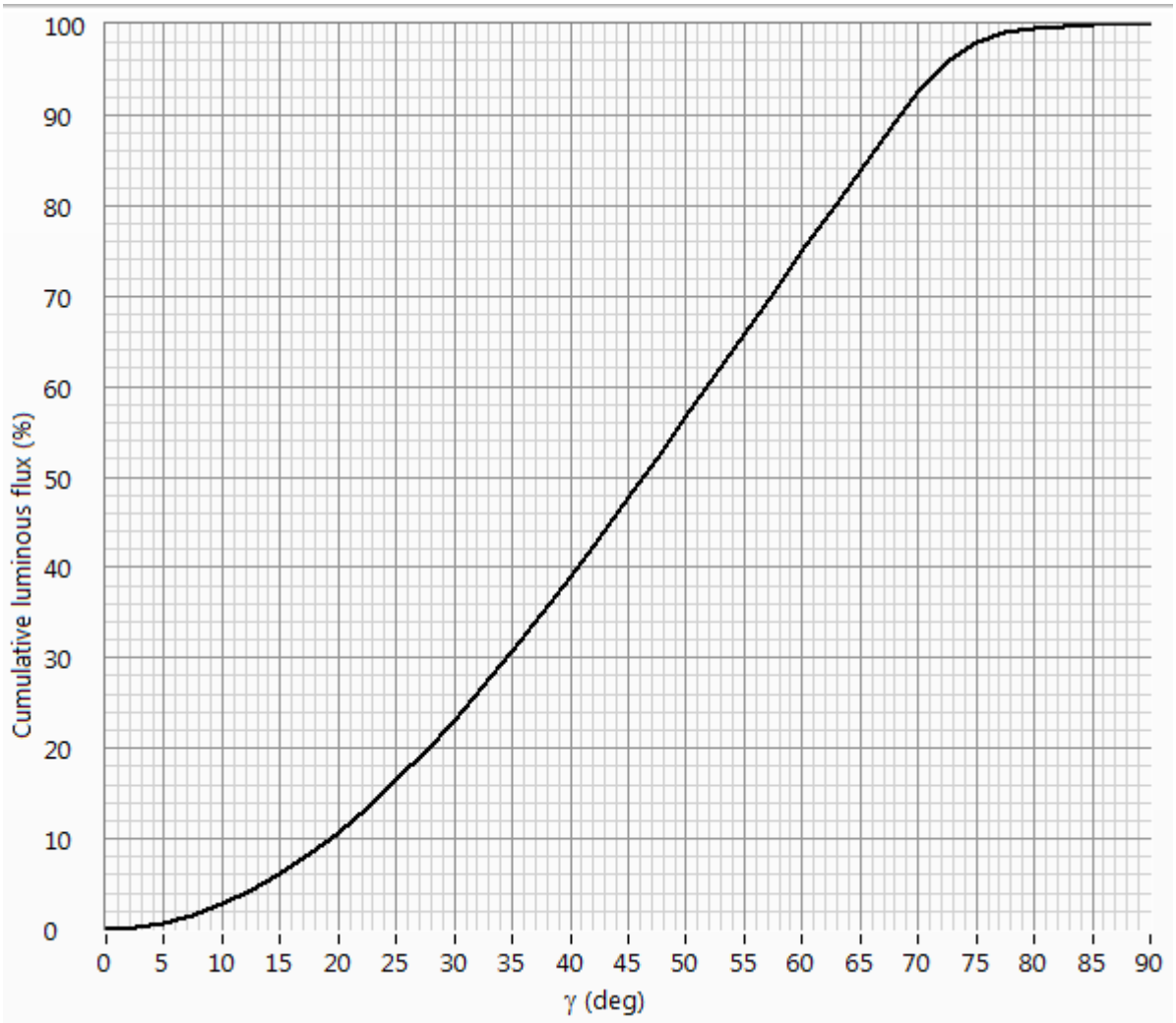
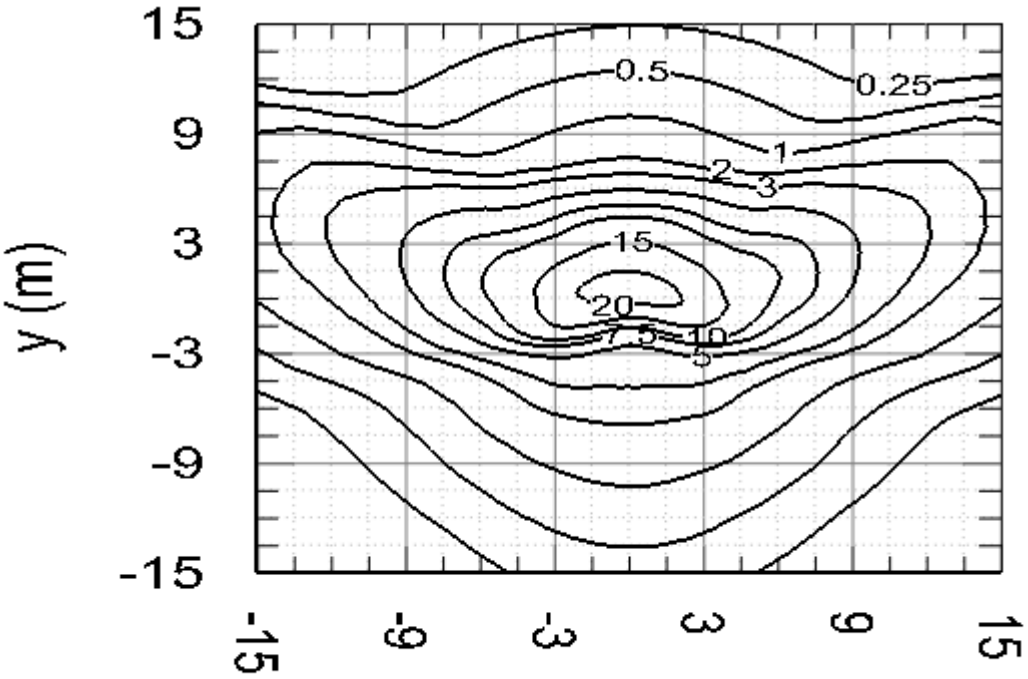
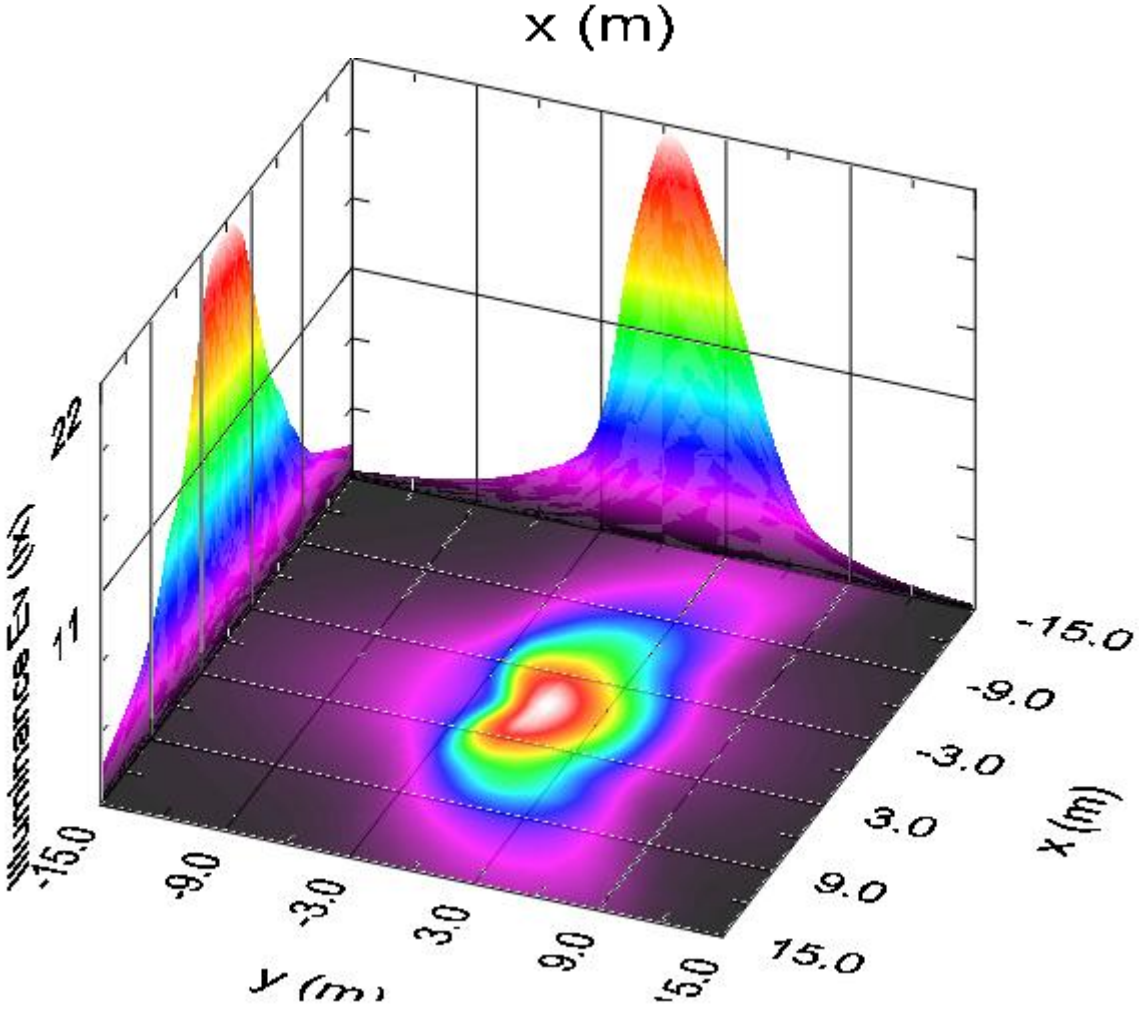


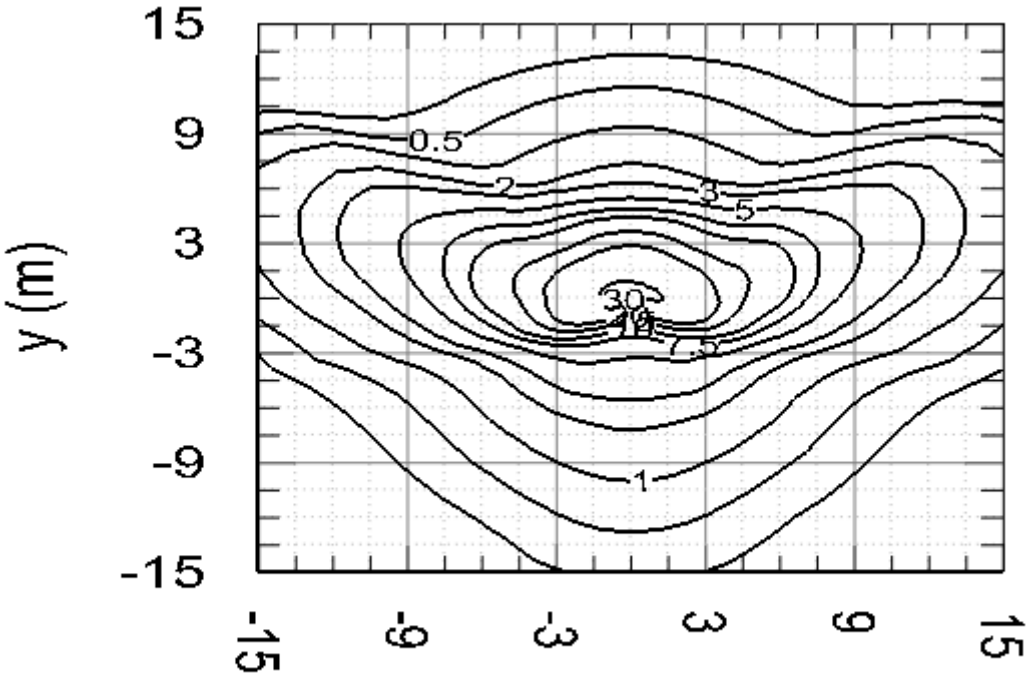
Figure 2. Cumulative luminous flux.

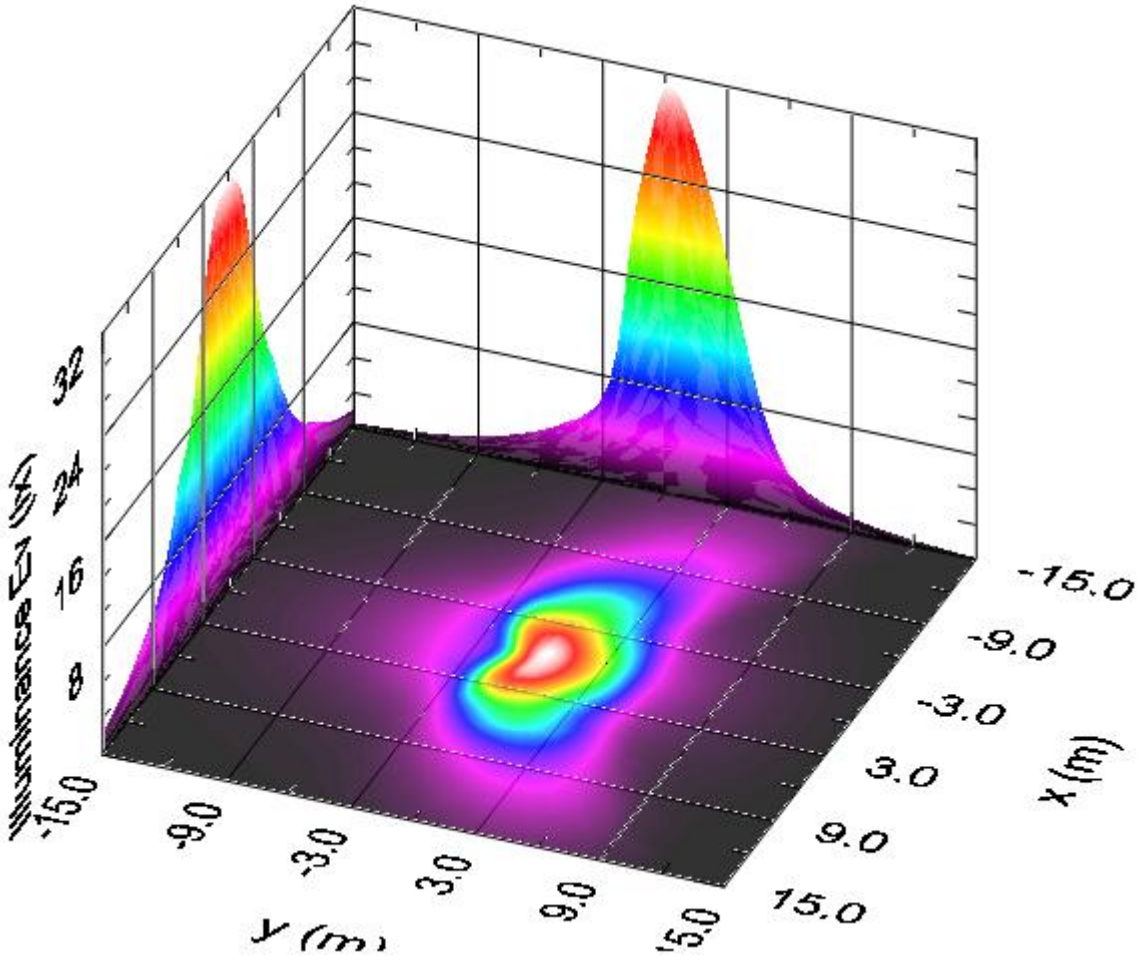
Mounting height = 6 m



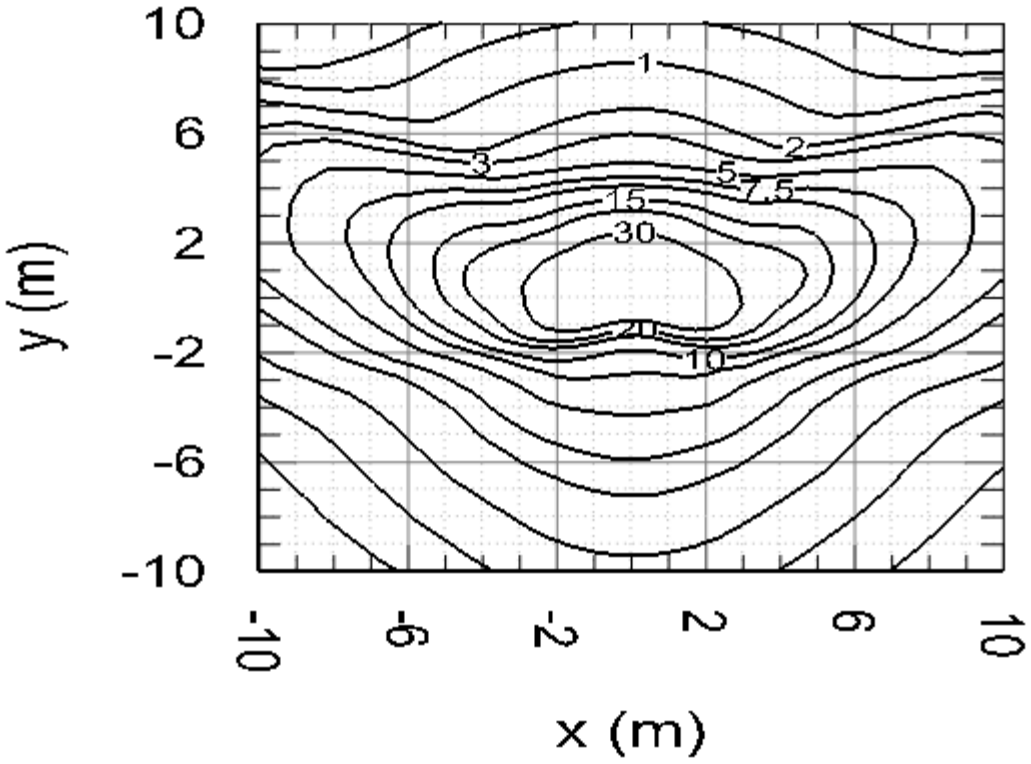


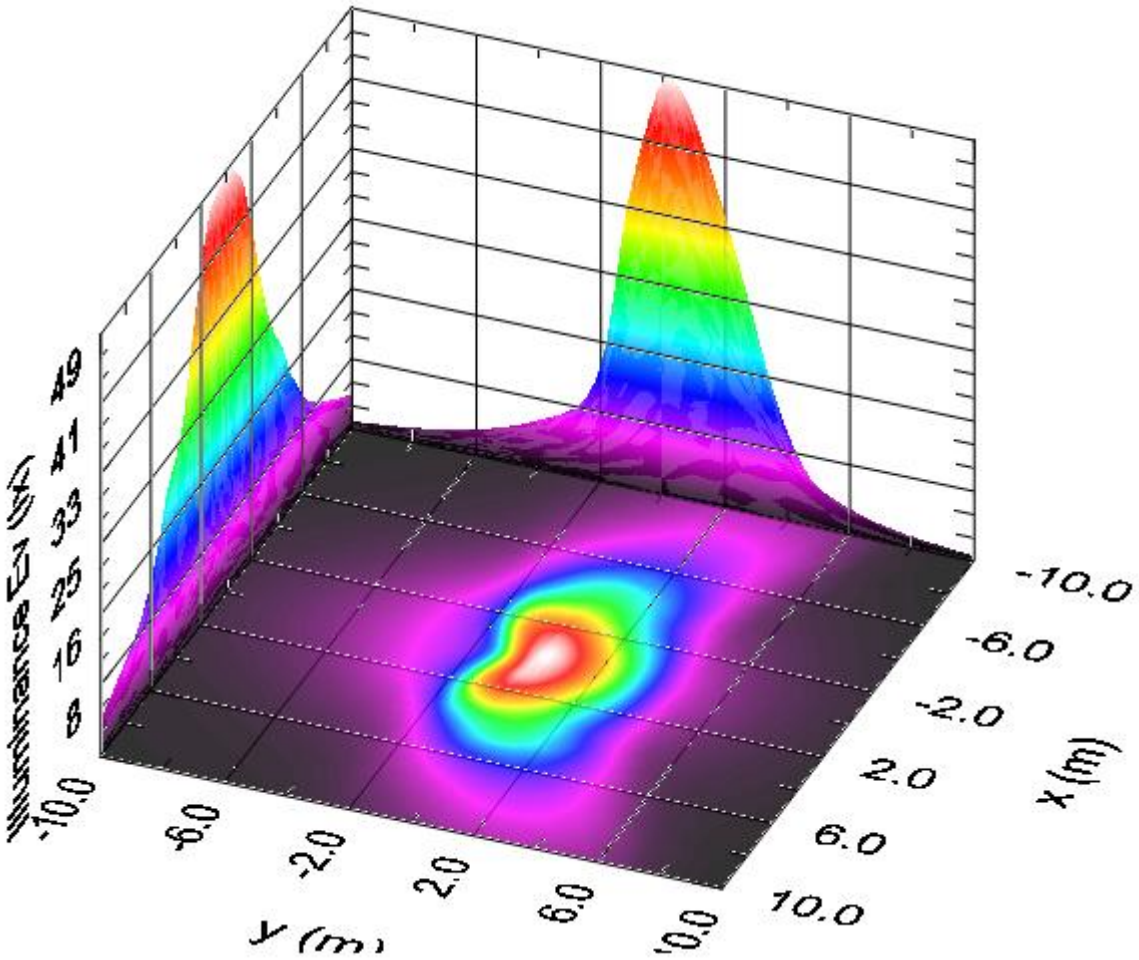
Mounting height = 5 m



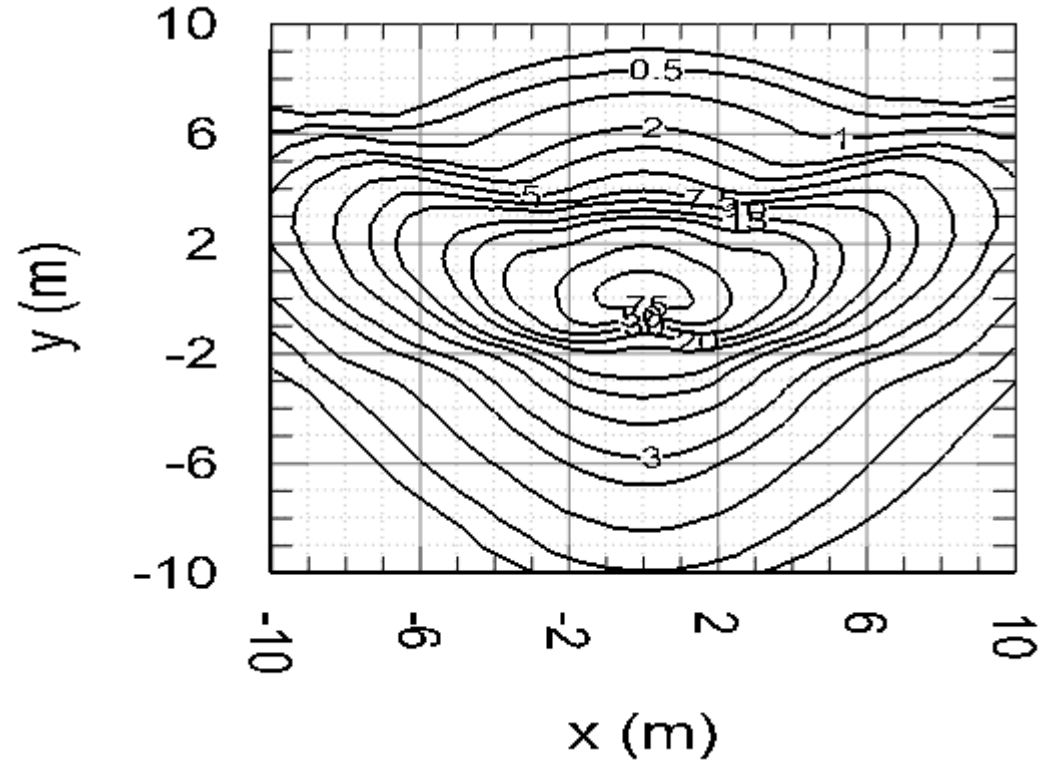


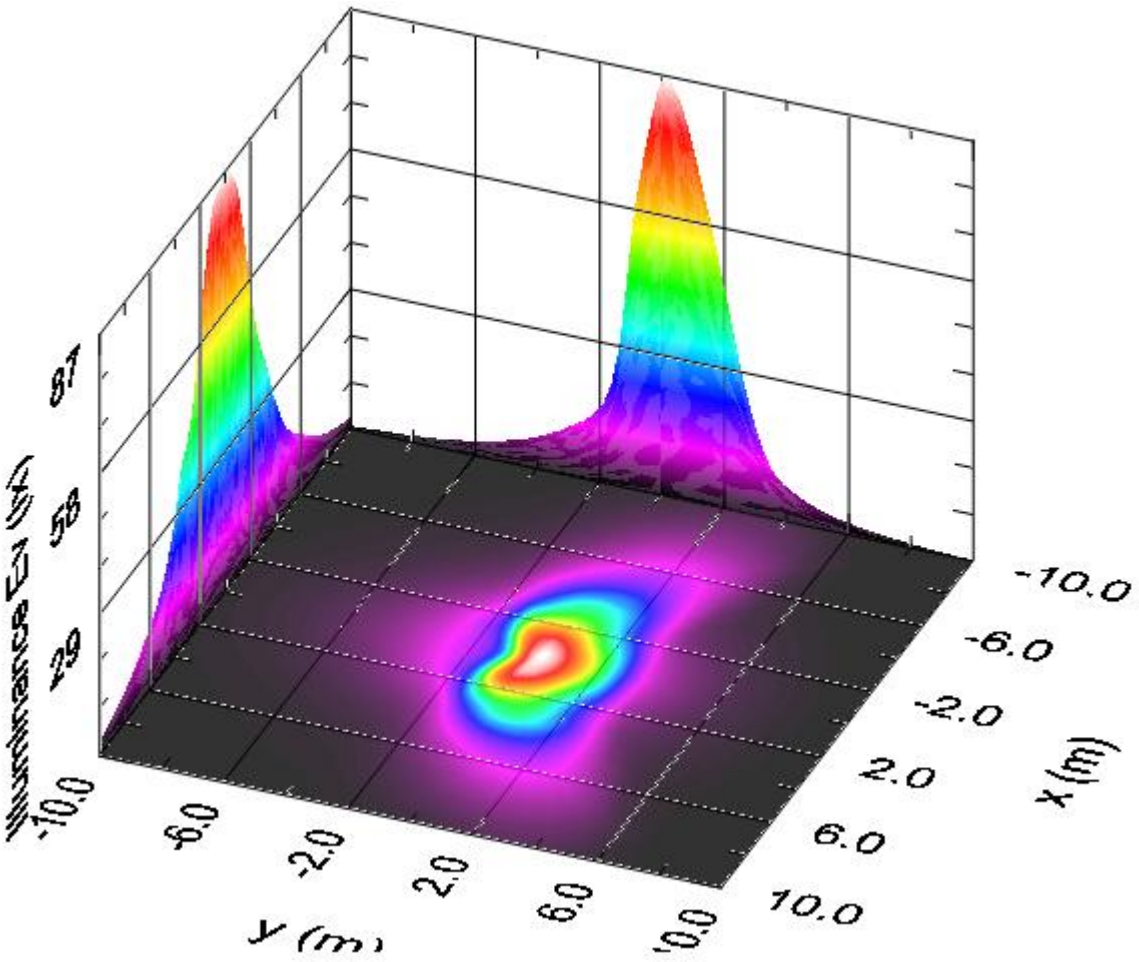
Mounting height = 4 m





Mounting height = 3 m





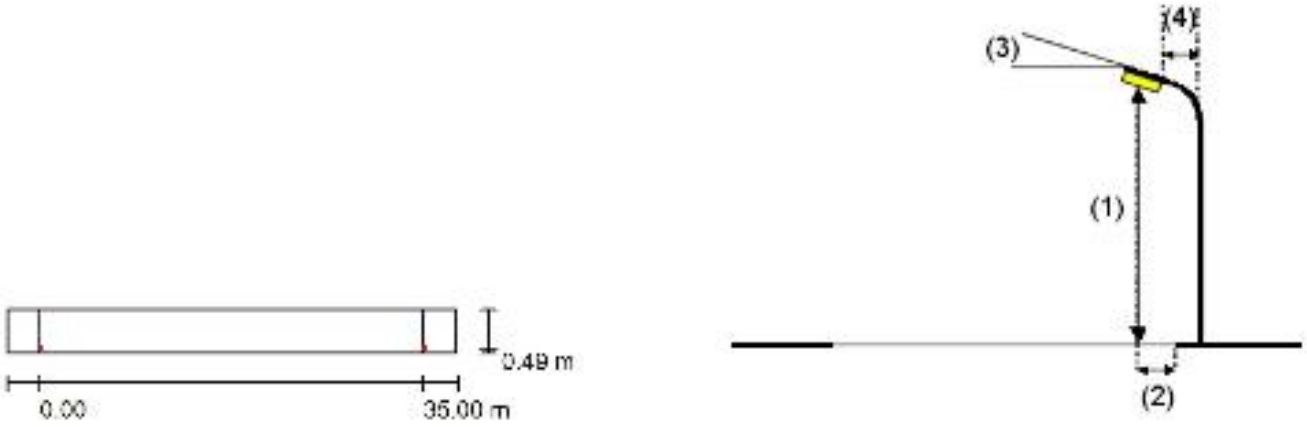
Katu 1 / Planning data

Street Profile

Ajorata 1 (Width: 4.000 m, Number of lanes: 1, tarmac: R2, q0: 0.070)

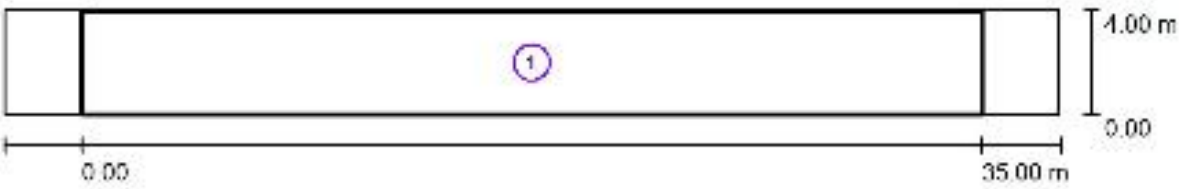
Maintenance factor: 0.80

Luminaire Arrangements



Luminaire:	Karlux Lahti led tieoptiikka-2 Lahti led tieoptiikka-2		
Luminous flux (Luminaire):	3172 lm	Maximum luminous intensities	
Luminous flux (Lamps):	3171 lm	at 70°:	585 cd/klm
Luminaire Wattage:	43.9 W	at 80°:	131 cd/klm
Arrangement:	Single row, bottom	at 90°:	1.12 cd/klm
Pole Distance:	35.000 m	Any direction forming the specified angle from the downward vertical, with the luminaire installed for use.	
Mounting Height (1):	6.000 m		
Height:	5.925 m	No luminous intensities above 95°.	
Overhang (2):	0.500 m	Arrangement complies with luminous intensity class G2.	
Boom Angle (3):	5.0 °	Arrangement complies with glare index class D.5.	
Boom Length (4):	1.000 m		

Katu 1 / Photometric Results



Maintenance factor: 0.80 Scale 1:294

Calculation Field List

1 Arviointikenttä Ajorata 1
Length: 35.000 m, Width: 4.000 m
Grid: 12 x 3 Points
Accompanying Street Elements: Ajorata 1.
Selected Lighting Class: S4 (All lighting performance requirements are met.)

	E_{av} [lx]	E_{min} [lx]
Calculated values:	7.50	1.05
Required values according to class:	≥ 5.00	≥ 1.00
Fulfilled/Not fulfilled:	✓	✓