

## Optical Analysis

**Customer:**

Secto Design

Secto Design Oy  
Kauppalantie 12  
02700 Kauniainen, Finland

**Research contract:**

ref.no: ta25042013AK.pdf

**Target:**

Secto Design luminaire, Secto 4201 pendant luminaire (shown in Fig. 1).

Handmade design pendant. Crafted in Finland of PEFC-certified formpressed Finnish birch by highly skilled craftsmen.

Finishes of the shade:

Natural birch  
White laminated  
Black laminated  
Walnut veneer

Cable: standard length 150 cm, heat-resistant, ceiling plug + ceiling cup

Manufacturer: Secto Design  
Designer: Seppo Koho

**Fig. 1.** Secto 4201. The tested luminaire was with laminated black finish.



**Testing time:**

The start of the test: 12<sup>th</sup> June, 2013  
The end of the test: 15<sup>th</sup> August, 2013

**Purpose of the test:**

The goal of these measurements is to determine the light intensity distribution of the luminaire for lighting design purposes.

**Test method:**

The light intensity distribution of the luminaire is measured in a goniometer. The goniometer moves a detector of a photometer around the luminaire in one vertical plane and records the

illuminance. The luminaire can be rotated around the vertical axis (horizontal angles).

Vertical angles (around the horizontal axis):  $0^{\circ} - 180^{\circ}$ , measurement in five-degree increments

Horizontal angles (C-planes):  $0^{\circ}$  and  $90^{\circ}$  (luminaire is circularly symmetric in horizontal plane).

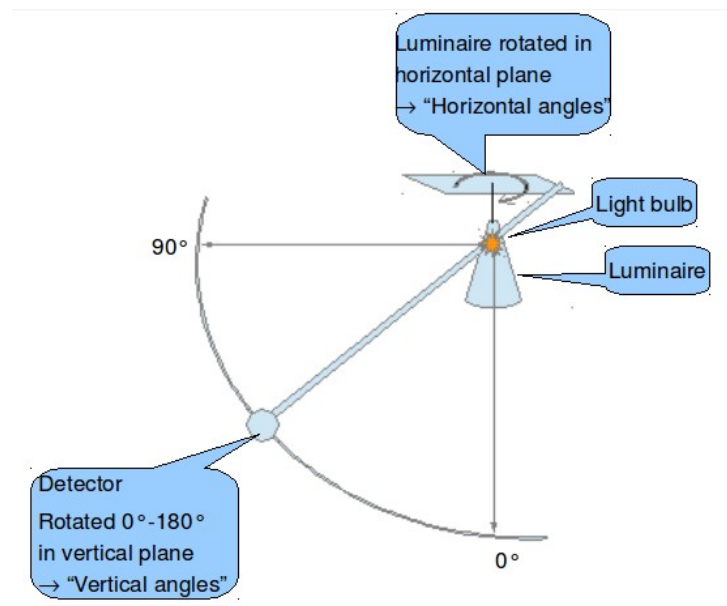
#### Validation of the test method:

The light intensity distribution curves provide the designer with important information about the way light is distributed from the luminaire towards e.g. the surrounding walls. This information can be used e.g. with DiaLux modelling software to model how the lighting changes the ambiance in a room.

#### Performed actions:

Light intensity distribution of Secto 4201 with laminated birch slats was investigated. Megaman WL223 Liliput, E27 light bulb (1371 lm, 3000 K) was used during the measurement.

The test arrangement is shown schematically in Fig. 2. The detector of a photometer is mounted in a goniometer. The goniometer can be rotated in a vertical plane. The luminaire is installed in such a way that the centre of the light bulb is placed at the origin of the goniometer.

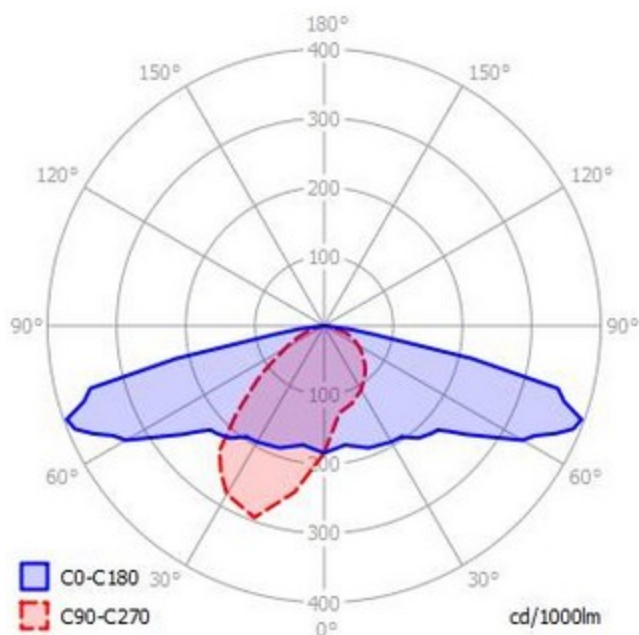


**Fig. 2.** Scheme of the test arrangement.

The measurement in vertical angles was performed in five-degree increments in the range of  $0^{\circ} - 180^{\circ}$ .

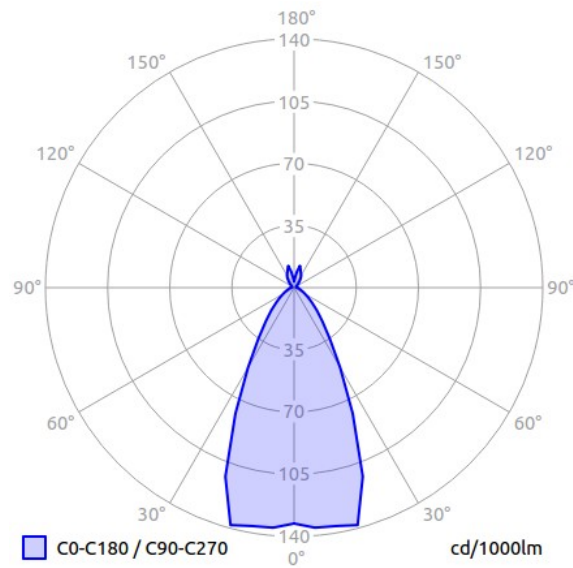
Circular symmetry of the light distribution was expected. In order to verify the symmetry, the measurement was performed in two vertical planes,  $0^{\circ}$  and  $90^{\circ}$ . This was implemented by rotating the luminaire  $90^{\circ}$  in horizontal plane. The results being similar proves the symmetry.

Figure 3 shows an example of a light distribution curve. The diagram represents a cut in a plane through a luminaire or lamp and shows the intensity of light emitted in each direction. The centre of the light source is at the origin. The direction 0° is the downward direction and 180° is the upward direction. The straight radial lines in Fig. 3 indicate the angle of the light emitted while the circles are intensity contours. The intensity values of the light distribution curve are scaled to correspond to 1000 lm from the light source (cd/1000 lm). The real cd-value for a specific light bulb can be calculated by multiplying by the 1/1000 of the lumen-value of the bulb. Blue and red curves show light intensity distribution at perpendicular horizontal angles (=C-planes).



**Fig. 3.** Light intensity distribution curve. From ref. <http://sourceforge.net/projects/qlumedit/> (14.4.2013)

Light distribution curve of the Secto 4201 luminaire is shown in Fig. 4. The curve was determined using QLumEdit program.



**Fig. 4.** Light distribution curve of Secto 4201. Since the luminaire is symmetric the light distribution curve is similar at every C-planes. Only the C-plane 0° is presented.

**Used equipment:**

Goniometer, No. 59

Photometer, No. 50, calibrated 28<sup>th</sup> May, 2013, calibration is valid

**Analysis/Recommendations:**

N/A

**Conclusions:**

The light intensity curve of the luminaire under test was determined (see **Fig. 4**).

**Remarks:**

Actions, operations and reporting are in accordance with IEC/ISO 17025 'General requirements for the competence of testing laboratories'.

This review report is based on research report SectoDesignJuselius\_\_tr010513AK.pdf.

**Signatures:** 

Riitta Perälä

Littoinen 10<sup>th</sup> June, 2014

