OliNo
Duurzame Energie
www.OliNo.org

Lamp measurement report – 17 Jan 09 for Line Lite International BV

Line Lite International BV Cree Milky White

Lamp measurement report – 17 Jan 09 for Line Lite International BV

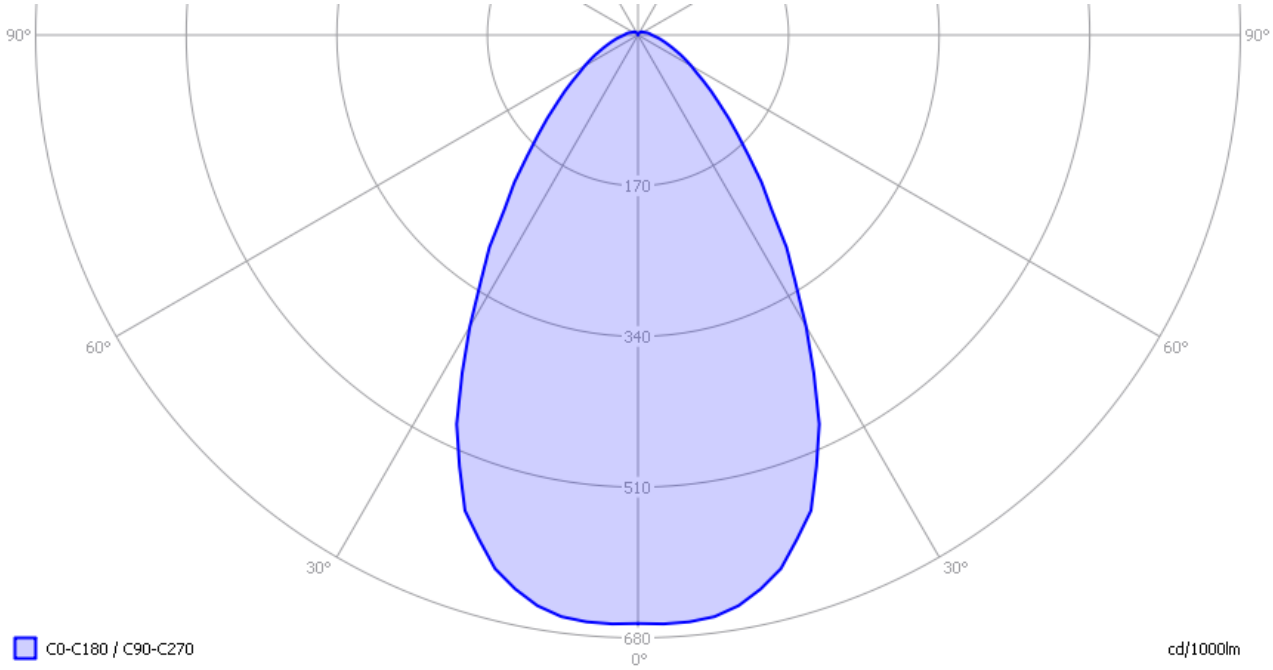
Summary measurement data

parameter	meas. result	remark
Color temperature	2605 K	Deep warm white
Luminous intensity I_v	45 Cd	
Beam angle	65 deg	
Power P	3.0 W	
Power Factor	0.44	For every 1 kWh net power consumed, there has been 2.1 kVAhr for reactive power.
Luminous flux	68 lm	
Luminous efficacy	22 lm/W	
CRI_Ra	80	Color Rendering Index.
Coordinates chromaticity diagram	x=0.4592 and y=0.3970	
Fitting	E27	
D x H external dimensions	63 x 107 mm	External dimensions of the light bulb.
Diameter luminous area	63 mm	Dimensions of the luminous area (used in Eulumdat file). This is the diameter of the bulb.
General remarks		The ambient temperature during the whole set of measurements was 22.5 - 26.5 deg C. Warm up effect: the illuminance increases with 10 % during the warm up time. Voltage dependency: consumed power and illuminance are relatively insensitive to light bulb voltage. Note: according to the supplier, these light bulbs have the Kema Keur label.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

Eulumdat light diagram

An interesting graph is the light diagram, indicating the intensity in the C0-C180 and the C90-C270 plane. This light diagram below comes from the program Qlumedit, that extracts these diagrams from an Eulumdat file.



The light diagram giving the radiation pattern.

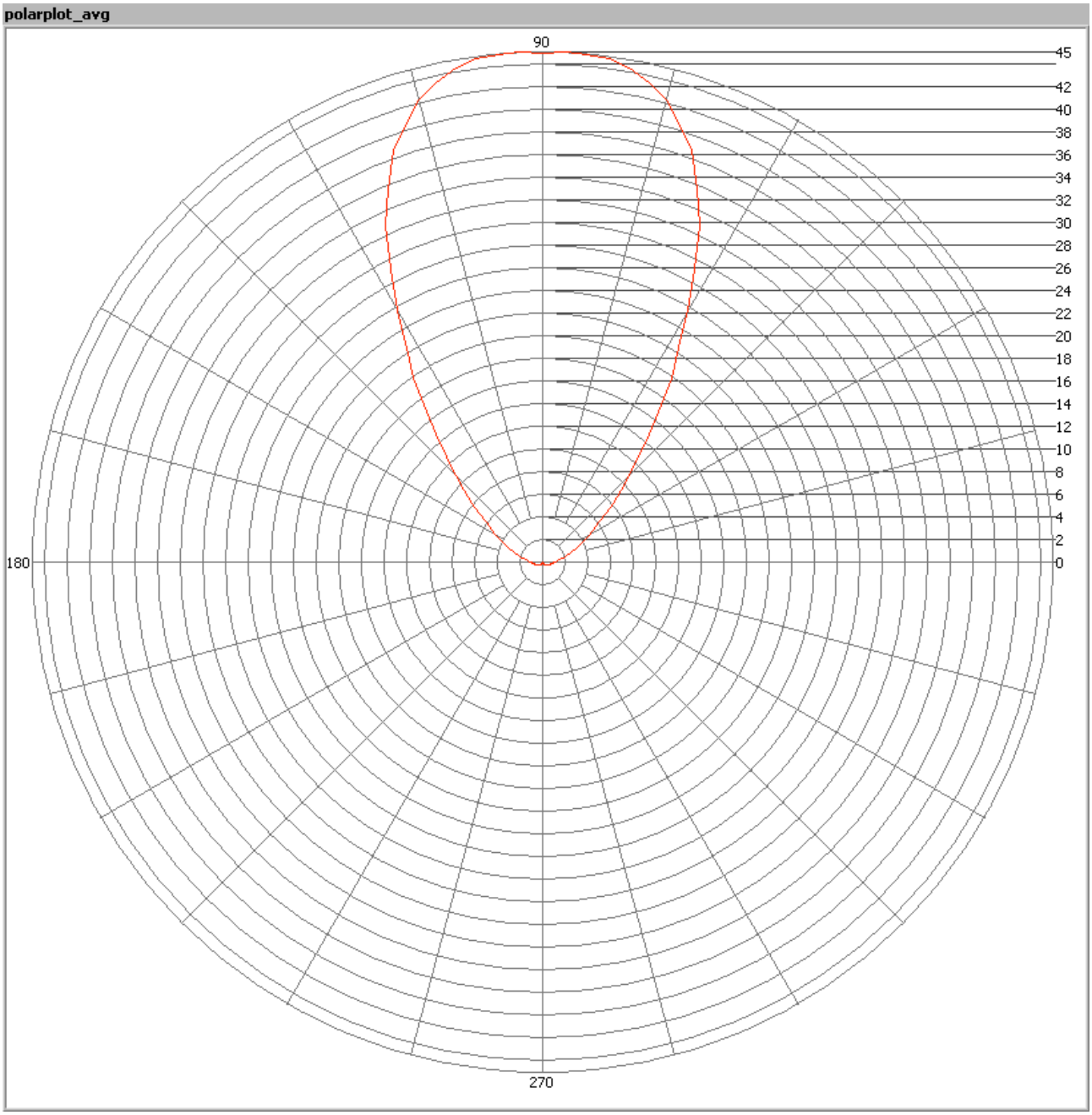
It indicates the luminous intensity around the light bulb. This light diagram is symmetrical around the z-axis.

The unit is Cd/1000lm, meaning the intensity in Cd assuming there would be 1000 lumen in the measured light bulb. This enables comparing different types of light bulbs.

Illuminance Ev at 1 m distance, or luminous intensity Iv

Herewith the plot of the *averaged* luminous intensity Iv as a function of the inclination angle with the light bulb.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

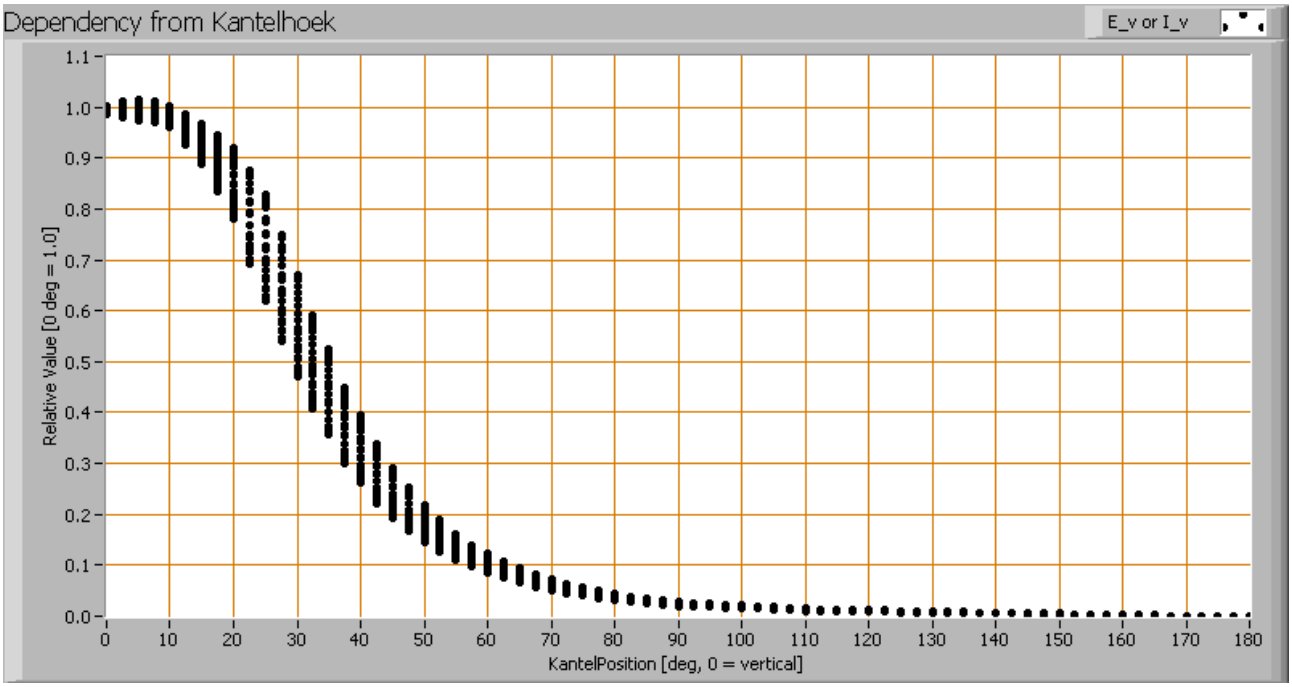


The radiation pattern of the light bulb.

This radiation pattern is the same as the one given earlier. This is because in this light bulb's case, the radiation pattern is symmetric around the z-axis, meaning that the averaged pattern given here is the same as the extraction of the Eulumdat file.

These averaged values are used (later) to compute the lumen output.

Lamp measurement report – 17 Jan 09 for Line Lite International BV



Intensity data of every measured turn angle at each inclination angle.

This plot shows per inclination angle the intensity measurement results for each turn angle at that inclination angle. So at 30 degrees inclination angle, all the measurement results of illuminance for all measured turn angles are in the range of 47-68 % of the illuminance value at 0 degrees inclination angle.

When using the average values per inclination angle, the beam angle can be computed, being 65 degrees.

Luminous flux

With the averaged illuminance data at 1 m distance, taken from the graph showing the averaged radiation pattern, it is possible to compute the luminous flux.

The result of this computation for this light spot is a luminous flux of 68 lm.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

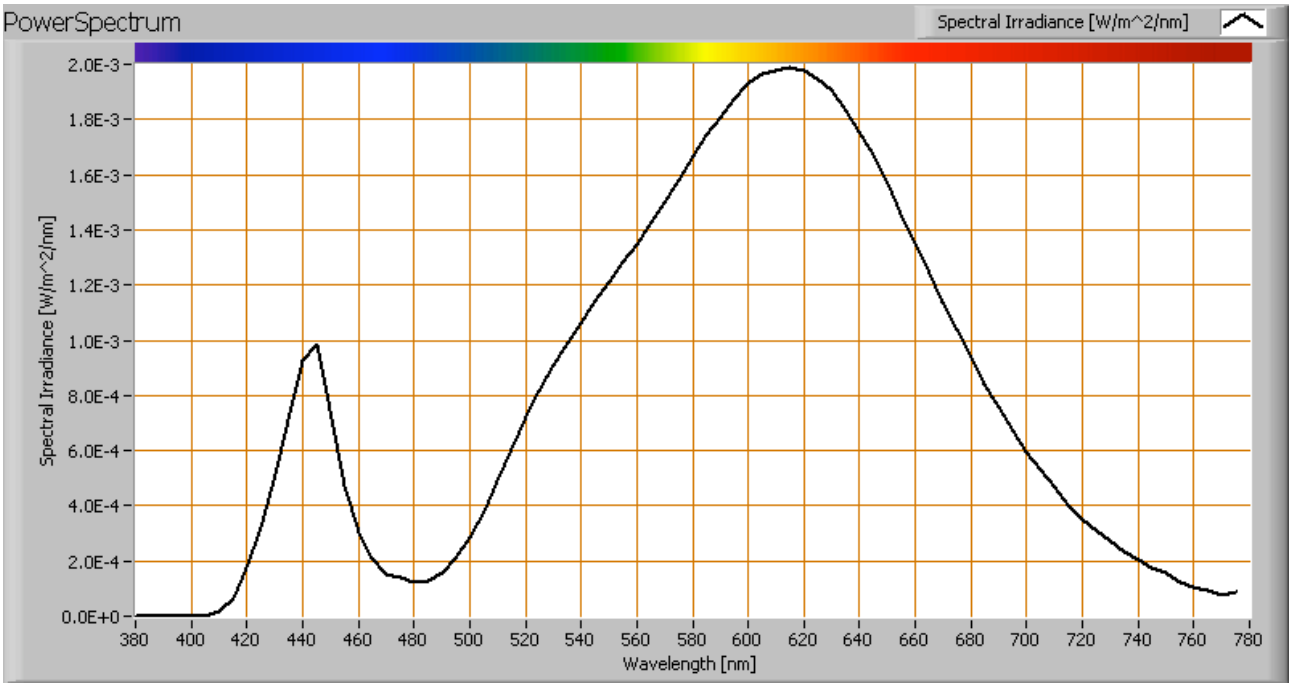
Luminous efficacy

The luminous flux being 68 lm, and the power of the lightbulb being 3.0 W, yields a luminous efficacy of 22 lm/W.

A power factor of 0.44 means that for every 1 kWh net power consumed, a reactive component of 2.1 kVAr was needed.

Light bulb voltage	230 V
Light bulb current	30 mA
Power P	3.0 W
Apparent power S	6.9 VA
Power factor	0.44

Color temperature and Spectral power distribution

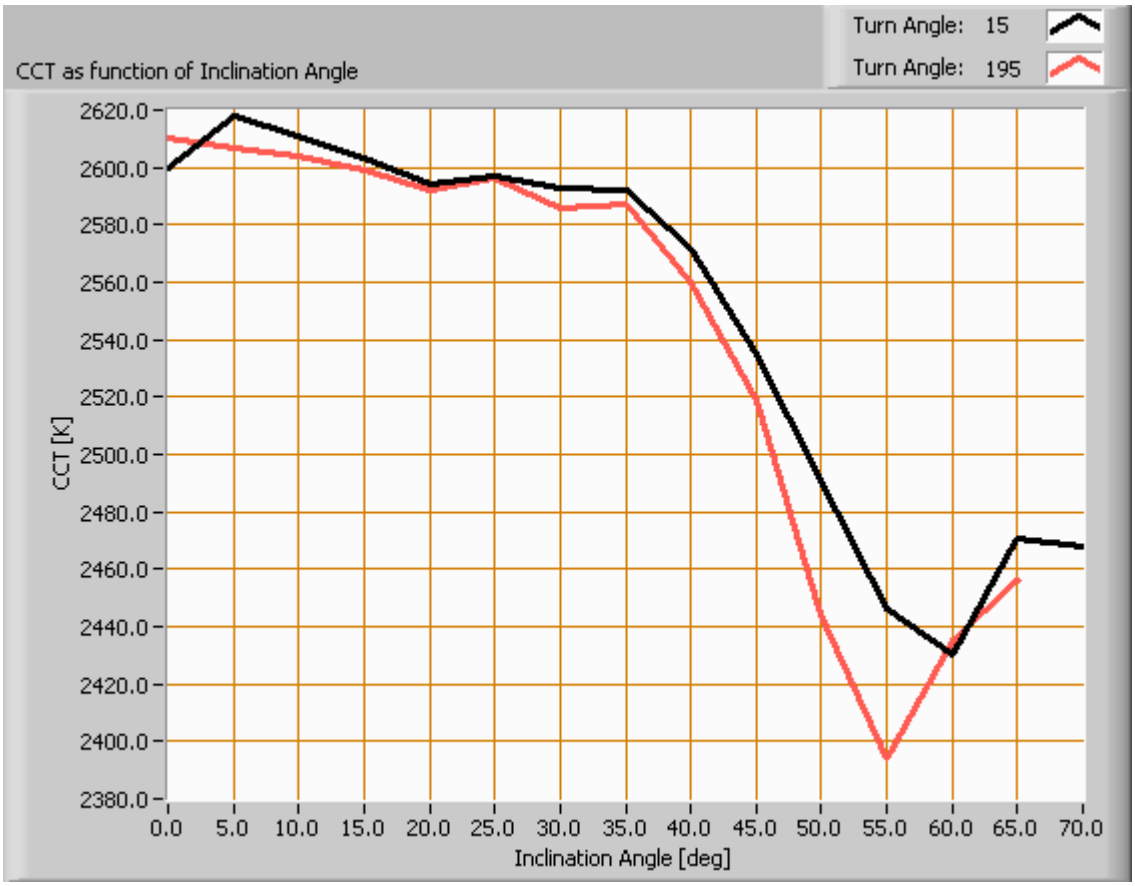


The spectral power distribution of this light bulb.

The measured color temperature is about 2600 K which is deep warm white.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

This color temperature is measured straight underneath the light bulb. Below a graph showing the color temperature for different inclination angles.

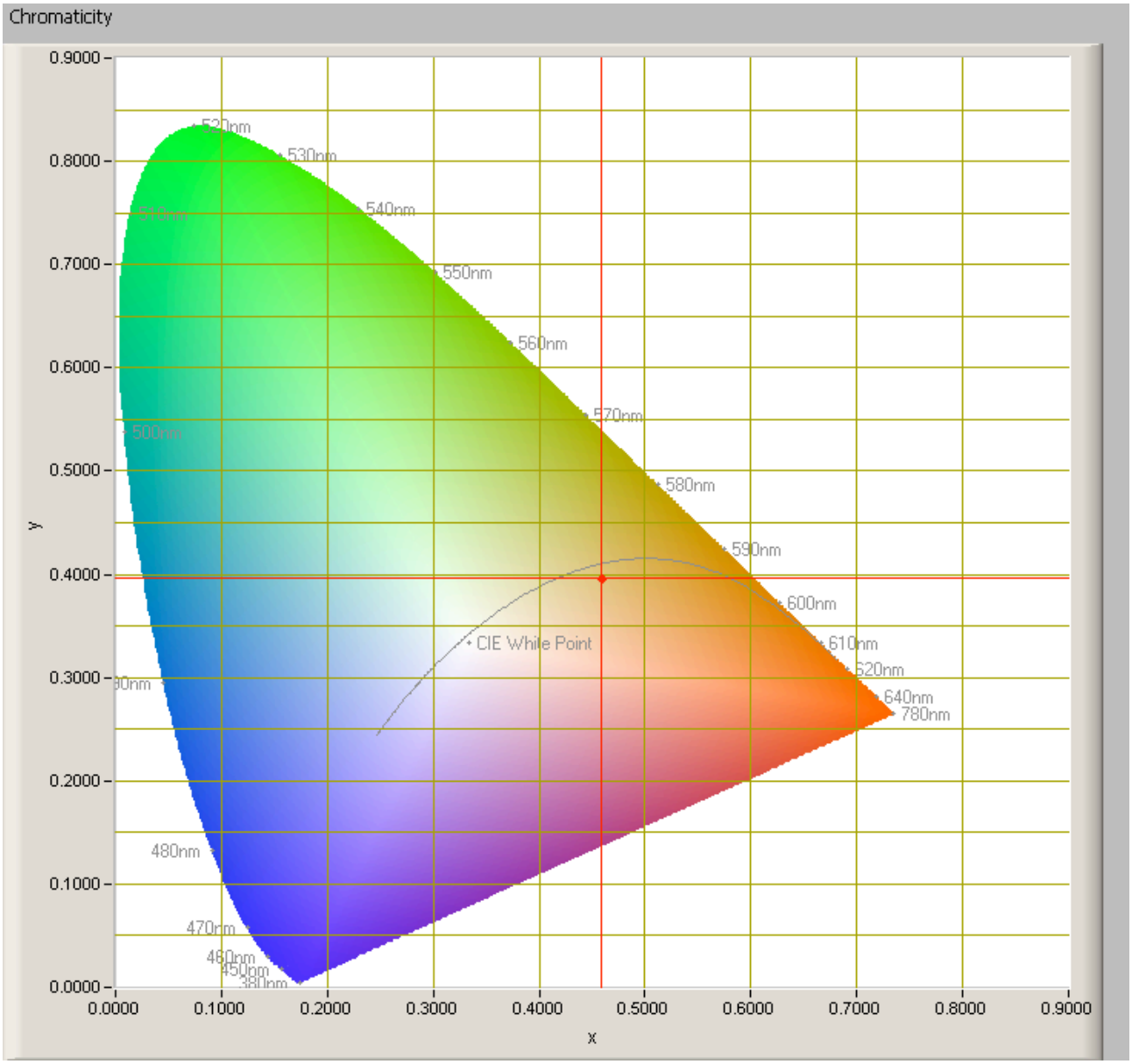


Color temperature as a function of inclination angle.

The maximum value of inclination angle is 70 degrees. Beyond that value there is virtually no intensity anymore. The color temperature shows about 8 % max deviation.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

Chromaticity diagram



The chromaticity space and the position of the lamp's color coordinates in it.

The light coming from this lamp is at a distance from the Planckian Locus (the black path in the graph).

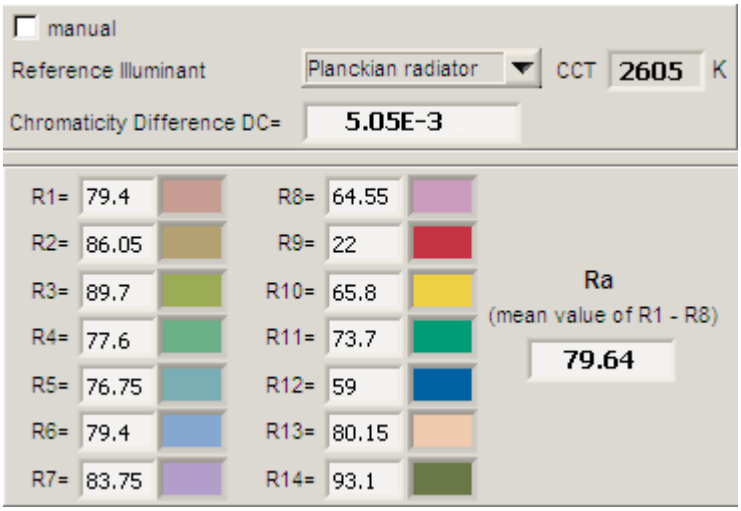
Its coordinates are x=0.4592 and y=0.3970.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

Color Rendering Index (CRI) or also Ra

Herewith the image showing the CRI as well as how well different colors are represented (rendered). The higher the number, the better the resemblance with the color when a black body radiator would have been used (the sun, or an incandescent lamp).

Each color has an index Rx, and the first 8 indexes (R1 .. R8) are averaged to compute the Ra which is equivalent to the CRI.



CRI of the light of this lightbulb.

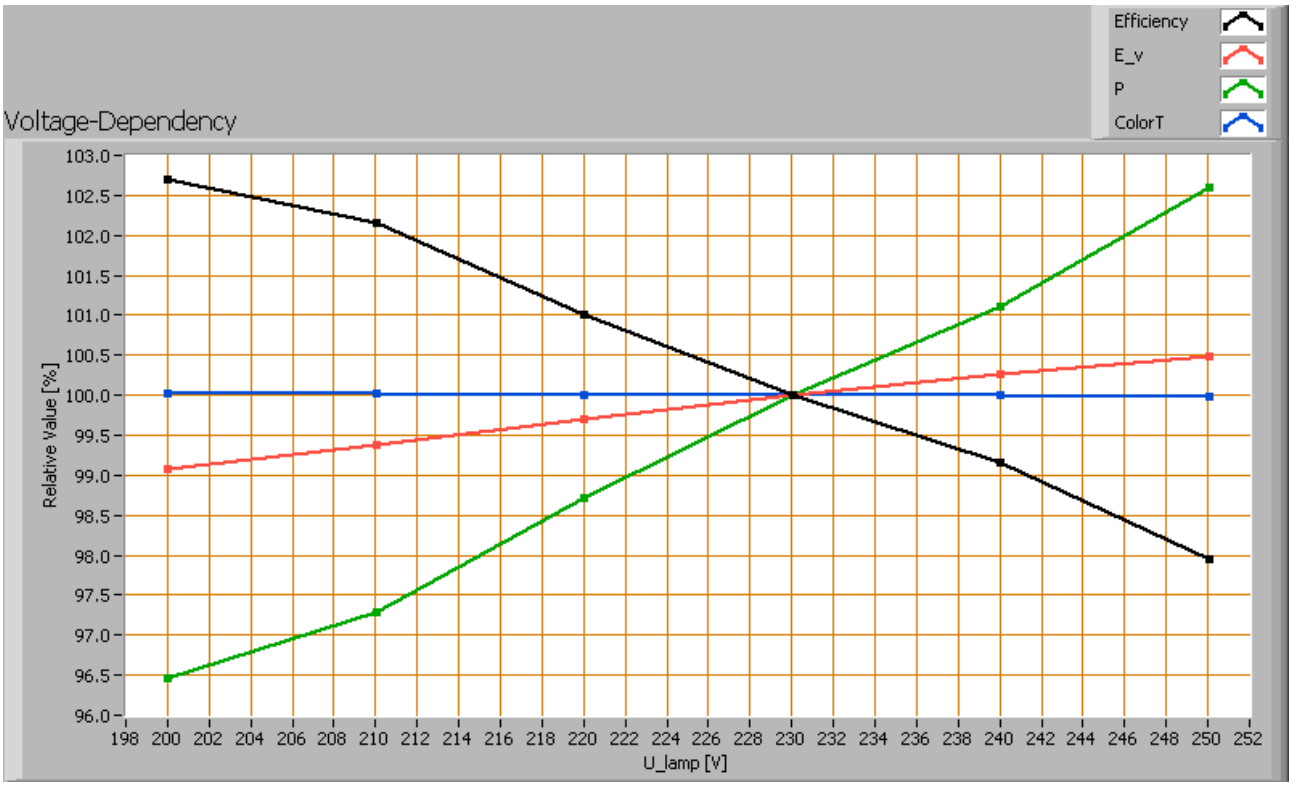
The value of 80 is equal to 80 which is considered a minimum value for indoor usage.

Note: the chromaticity difference is 0.0051 indicates the distance to the Planckian Locus. Its value is lower than 0.0054, which means that the calculated CRI result is meaningful.

Lamp measurement report – 17 Jan 09 for Line Lite International BV

Voltage dependency

The dependency of a number of lamp parameters on the lamp voltage is determined. For this, the lamp voltage has been varied and its effect on the following lamp parameters measured: illuminance E_v [lx], color temperature CT or correlated color temperature CCT [K], the lamppower P [W] and the luminous efficacy [lm/W].



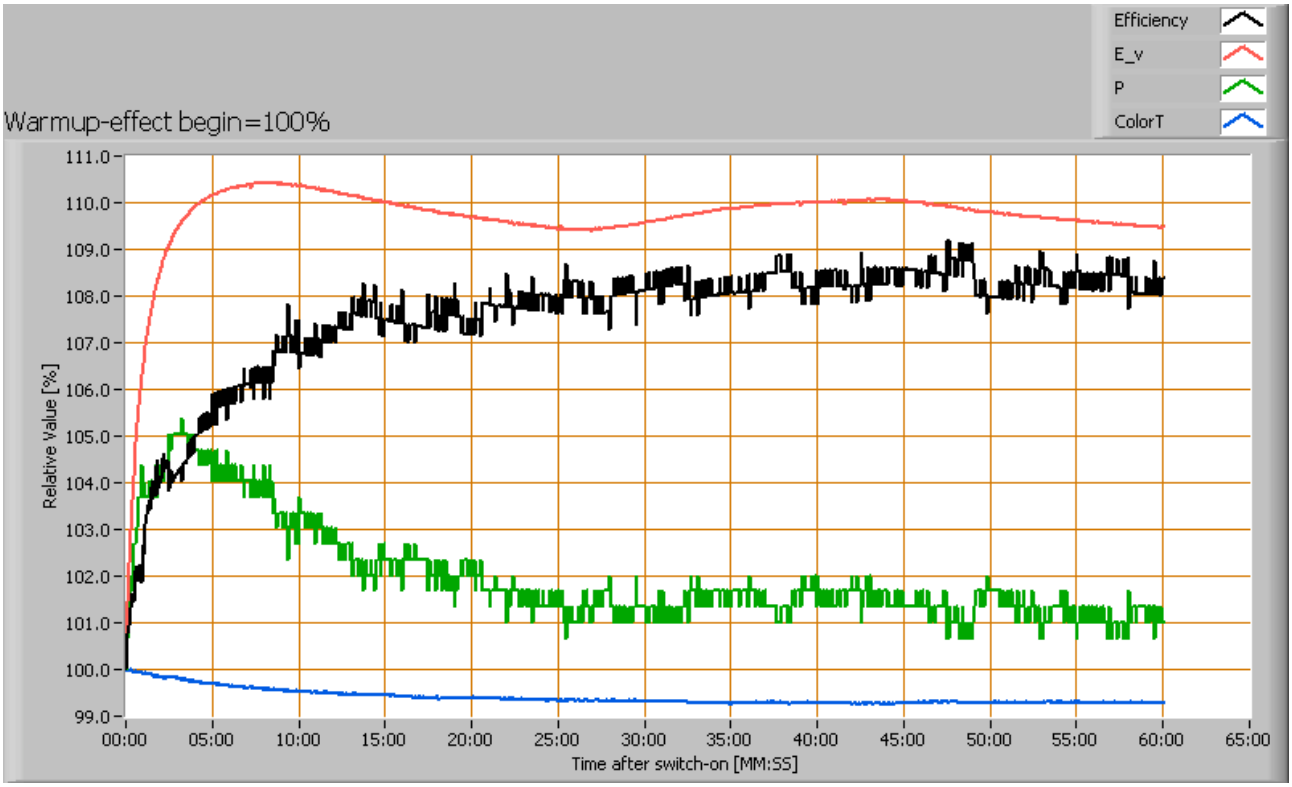
Lamp voltage dependencies of certain light bulb parameters, where the value at 230 V is taken as 100 %.

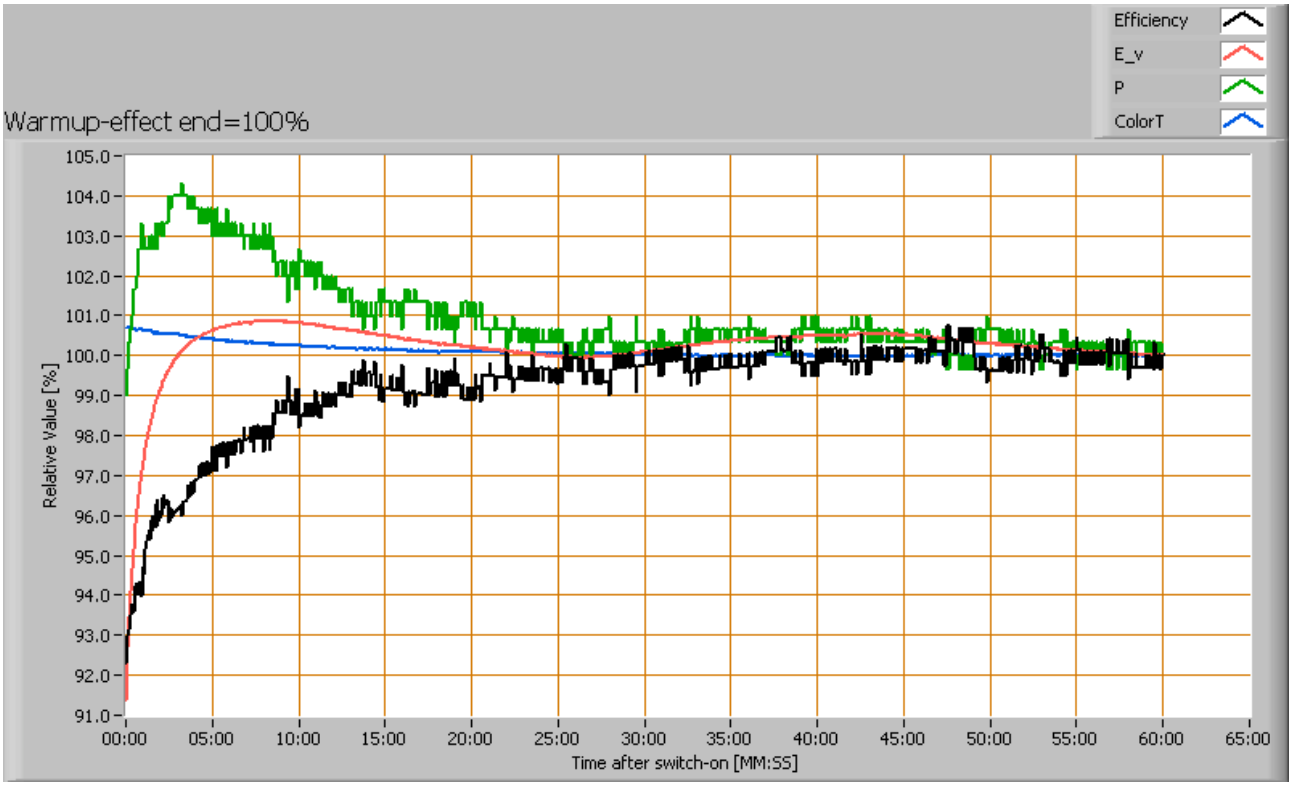
The consumed power and the illuminance hardly depend on the light bulb voltage; the max variation in the illuminance being about 3.5 %. When the voltage around 230 V varies with + and - 5 V, then the illuminance varies with less than + and - 0.2 %, which is not visible.

Warm up effects

After switch on of a cold lamp, the effect of heating up of the lamp is measured on illuminance E_v [lx], color temperature CT or correlated color temperature CCT [K], the lamppower P [W] and the luminous efficacy [lm/W].

Lamp measurement report – 17 Jan 09 for Line Lite International BV





Lamp measurement report – 17 Jan 09 for Line Lite International BV

Effect of warming up on different light bulb parameters. At top the 100 % level is put at begin, and at bottom at the end.

The illuminance increases 10 % which is remarkable for a led light. Normally when leds warm up, their efficiency drops. Maybe the power unit of this light increases the lamp current when it warms up.

It is also remarkable that the efficiency increases during the warm up time. This would mean that the power unit also increases its efficiency when it warms up.

The warm up time duration is about 25 minutes. The small variations seen after that time are due to the ambient temperature changes in the room where was measured.

Disclaimer