

Goniocolorimetric Test Report**MEASUREMENT METHOD**

The measurements were made by a goniophotometer at the dark room of SSL Resource Ltd. The spectral radiant intensities of a light source at different directions were measured with a calibrated spectrometer located at a known distance from the light source.

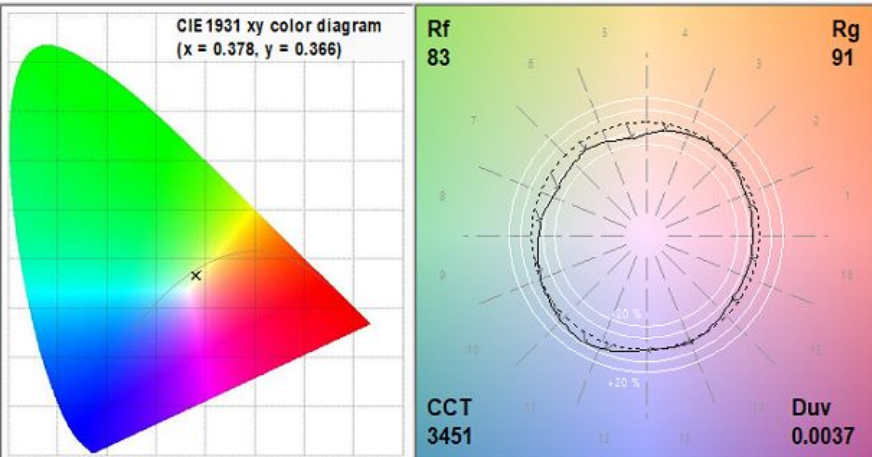
MEASUREMENT UNCERTAINTY

The photometer (SSL L-200, sn L200-004) used in goniophotometer is traceable to national standard of illuminance responsivity at VTT-MIKES (Certificate of calibration T-R 962 signed on 27 October 2016). 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.

Table - Measurement information

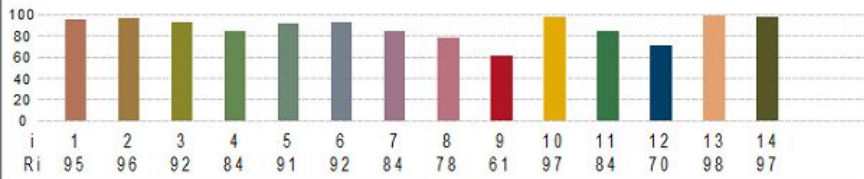
Ambient temperature of the laboratory	25.0 degC
Power supply	230.0 Vac
Measurement distance	3484 mm
Location of the rotation axis (behind the outermost surface of the optics)	4 mm
Angular step, C plane	90.0 deg
Angular step, gamma angle	5.0 deg
Maximum gamma angle	80.0 deg

GonioSpectroRadiometric Test Report



Ra (R1-R8) = 89

Special color rendition index CRI Ri 1-14



Fidelity indices Rf of the 16 hue bins

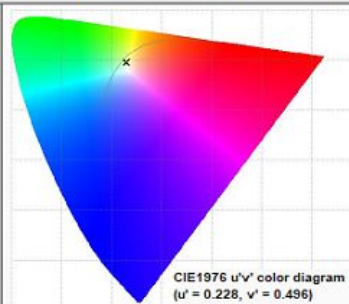
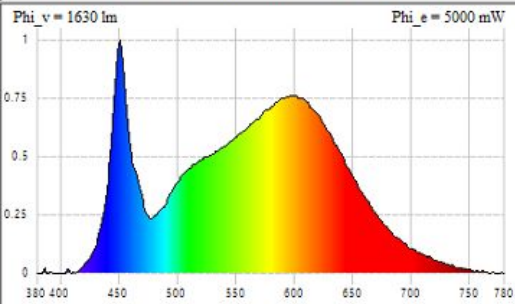


Table - Measurement results of the total colorimetric parameters

Color coordinates in CIE 1931 diagram	x,y	(0.3783, 0.3659)
Color coordinates in CIE 1976 diagram	u',v'	(0.2281, 0.4964)
Correlated color temperature	CCT	3977 K
General color rendering index	CRI, Ra	89.0
Spatial color uniformity	SDCM	0.7
Distance from Planckian locus	Du'v'	0.005

Weighted average of the angular color measurements. --SDCM = Maximum deviation of the angular u', v' measurements from the weighted average. -- SDCM corresponds 1-step MacAdam Ellipse, 1 SDCM corresponds to u'v' = 0.001

Table - Total special color rendering indeces















R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
94.8	96.5	91.8	83.9	91.0	92.5	83.7	78.2	60.6	96.7	84.3	70.0	98.5	97.0
													

Figure - Color classification and MacAdam ellipse / SDCM ANSI C78.377

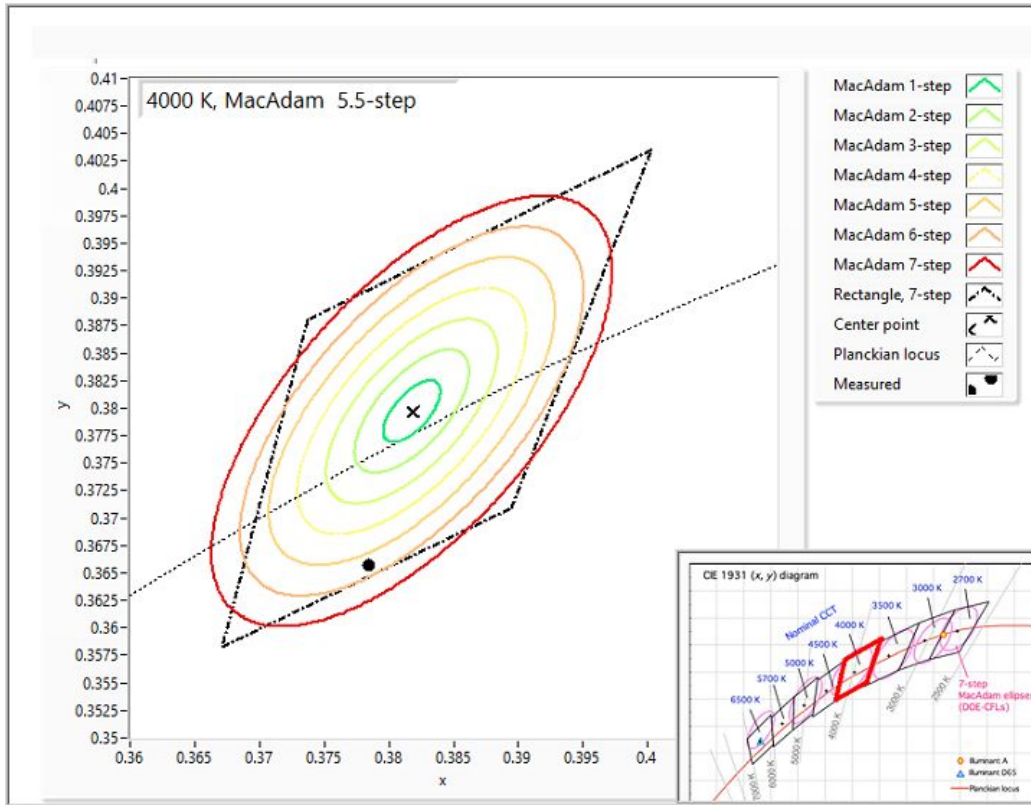


Table - Color rendition details according to TM30-18

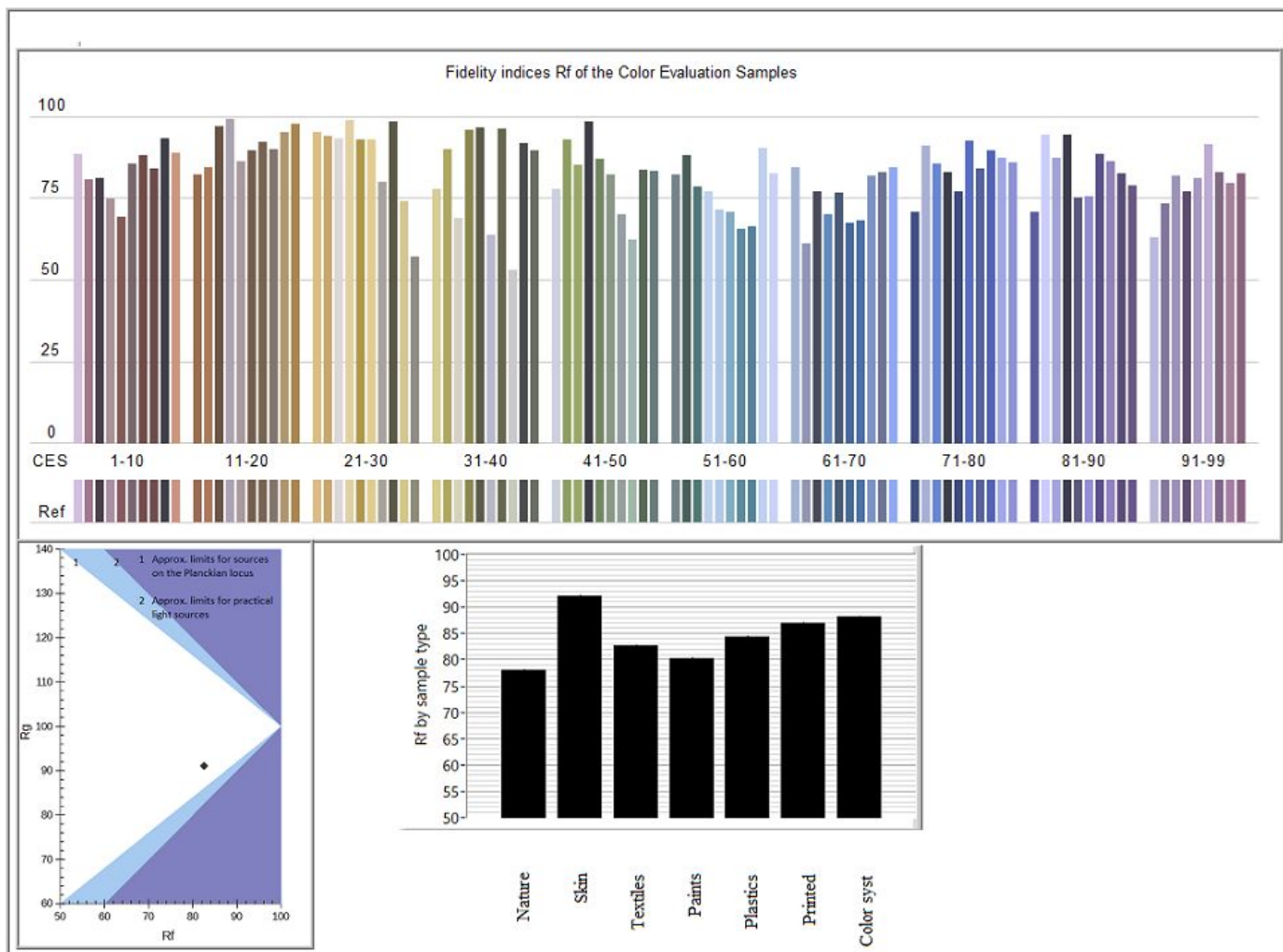


Table - Results of the absolute spectral distribution measurement

Luminous Flux	F	1751 lm
Electrical Power	PeI	17.8 W
Optical Power	Popt	5.13 W
Thermal Power	Pth	12.67 W
Luminous Efficacy	LPW	98.37 lm/W
Luminous Efficacy of Spectrum	LER	341.32 lm/W
Wall-Plug Efficiency	WPE	21.5 %
Photosynthetic Photon Flux	PPF	24.1 μmol/s