

Report – Luminous & Spectral Reflectance Measurements



25JAN2015

Ceilume

PO Box 511

Graton, CA 95444 USA

+1 (800) 557-0654

www.ceilume.com

Ceilume Sustainable Ceiling Tiles and Panels White

The total Luminous Reflectance for the 10° Observer under Illuminant D-65 is equal to:

$$\text{CIE } Y_{D65-10^\circ} = 87.41$$

Measurement Modality

The measurement of reflectance was made on a hemispherical / D8° geometry modality. This is in accordance with ASTM E 1477-98a(2013) *Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by use of Integrating Sphere Reflectometers*.

Certification

Color Science Consultancy certifies that the data are accurate and a true representation of the material. Further, Color Science Consultancy certifies that all the statements in this report are true and accurate to the best of my knowledge and belief.

Jack A Ladson

Jack A. Ladson

Color Science Consultancy

Color Science Consultancy

1000 Plowshare Road

Yardley, PA 19067

215-369-5005

Jack.Ladson@verizon.net

Report – Luminous & Spectral Reflectance Measurements

25JAN2015

Report on Luminous and Spectral Reflectance Measurements

Location

Reflectance test - the sample was measured at Hemmendinger Color Laboratory located in Tatamy, PA.

Equipment Used

The reflectance measurements were made on a Datacolor Spectraflash 100 spectrometer, serial number 1809. The calibration, data reduction and validation of the measurements with this instrument are based on the transmittance and reflectance standards from NIST, Gaithersburg, M.D. and the NPL, Teddington, UK.

Equipment Condition

The Datacolor Spectroflash 100 spectrometer, serial number 1809, use to make these measurements is in good working order. This was attested to by measuring standard reference materials BCRA set CCS-1, and comparing results to internationally accepted values.

Environment

The average temperature at the time of measurement was 24.8°C.

Interferences

There was no change in the standard laboratory conditions, which would affect the test results or have a negative influence on precision.

Deviations from Normal Procedure

There were no deviations from normal laboratory procedures or the applicable ASTM specifications that occurred during the measurement sequence.

Report – Luminous & Spectral Reflectance Measurements

Tristimulus Weighting Factors

The tristimulus weighting factors used to prepare the tristimulus data in this report are based on ASTM D 308, *Standard practice for computing the colors of objects by using the CIE system*. The tables and provide bandpass compensation in the calculation were selected.

Sampling

A single specimen was measured in multiple locations to ensure a statistically rigorous value.

Conditioning

The specimen was allowed ample time to stabilize to the measurement environment.

Precision

The instrumental uncertainty (repeatability) is less than 0.01 CIE Y, standard deviation unit under illuminant D-65 for the 1964 standard 10° observer. This is in accordance with the practice describing E 1345-98 (2014), *Standard practice for reducing the effect of variability of color measurement by the use of multiple measurements*.

The specimen was measured four times with replacement to achieve a measurement variation of less than 0.03 CIE Y standard deviation unit under illuminant D-65 for the 1964 10° observer. This is in accordance with the practice described in E 1345-98 (2014), *Standard practice for reducing the effect of variability of color measurement by the use of multiple measurements*.

This report shall not be reproduced, transmitted, or distributed in part without the expressed written consent of Color Science Consultancy.

Report – Luminous & Spectral Reflectance Measurements

Data Report

Sustainable	Read 1	Read 2	Read 3	Read 4	Mean	Std Dev
400	36.63	39.89	37.03	39.97	38.38	1.80
410	65.44	64.48	65.96	64.35	65.06	0.77
420	74.76	74.90	75.33	74.85	74.96	0.25
430	77.96	78.58	78.62	78.54	78.43	0.31
440	80.35	81.06	81.02	81.03	80.86	0.34
450	82.38	83.14	83.14	83.04	82.92	0.36
460	83.87	84.52	84.56	84.41	84.34	0.32
470	84.76	85.45	85.50	85.37	85.27	0.34
480	85.51	86.17	86.22	86.12	86.01	0.33
490	85.97	86.62	86.56	86.54	86.42	0.30
500	86.39	87.06	87.10	86.95	86.88	0.33
510	86.53	87.23	87.10	87.14	87.00	0.32
520	86.68	87.36	87.36	87.21	87.15	0.32
530	86.73	87.37	87.30	87.24	87.16	0.29
540	86.87	87.47	87.44	87.37	87.29	0.28
550	87.16	87.76	87.80	87.61	87.58	0.29
560	87.19	87.68	87.66	87.58	87.53	0.23
570	87.13	87.65	87.65	87.56	87.50	0.25
580	87.09	87.66	87.62	87.56	87.48	0.26
590	87.64	88.11	88.11	88.07	87.98	0.23
600	88.18	88.65	88.68	88.60	88.53	0.24
610	88.40	88.91	88.91	88.81	88.76	0.24
620	88.63	89.15	89.16	89.06	89.00	0.25
630	89.14	89.65	89.59	89.55	89.48	0.24
640	90.06	90.59	90.55	90.48	90.42	0.24
650	91.56	91.92	92.02	91.88	91.84	0.20
660	92.37	92.81	92.91	92.70	92.70	0.23
670	92.18	92.61	92.64	92.52	92.49	0.21
680	91.96	92.53	92.39	92.45	92.33	0.25
690	93.54	94.00	93.93	93.87	93.83	0.20
700	94.78	95.11	95.27	95.05	95.05	0.20

CIE X 82.45

CIE Y 87.41

CIE Z 87.49

CIE L* 94.91

CIE a* -0.82

CIE b* 4.39