

Handled by, department
Stefan Källberg
Measurement Technology
+46 10 516 56 26, stefan.kallberg@sp.se

Smart Signs AS
Solheimveien 30
NO-1473 Lørenskog
Norway

Measurement of photoluminescence according to DIN 67510-1:2009 (2 appendices)

Identification

Object One photoluminescent sign, PVC, 150x300 mm. See also picture in appendix 1.
Object state Upon arrival the object had no visual damages.
Arrival date Apr 29, 2011
Location Borås
Measurement date May 10, 2011

Measurement methods and procedures

The sample was exposed during a time of 5 minutes at 1000 lux from a 150 W xenon lamp filtered to D65. The illuminance at the measuring plane was measured with a luxmeter, Hagner, Model S2. After 5 minutes the xenon lamp was turned off and a luminance meter, Hagner ERP-105, connected to a PC-computer, was recording the luminance every minute during two hours. An aperture corresponding to a measuring spot of about Ø 30 mm was used in front of the ERP-105 detector. The measuring position is shown in appendix 1. The sample was kept under dark conditions for at least 48 h prior to excitation.

To determine the colour during excitation and attenuation, a spectrophotometer, Photo Research PR-705, was used. The excitation was done with the light source D65 at 1000 lux for 5 minutes and the attenuation colour measurement started about 15 seconds after the lamp was switched off.

In accordance with section 4.5 in DIN 67510-1, a logarithmic extrapolation of the results was made in order to determine the time when the luminance is 0,3 mcd/m², the decay time.

Measurement conditions

Room temperature (23 ± 2) °C
Relative humidity (45 ± 5) %
Illumination Perpendicular to the sample, CIE standard illuminant D65

SP Technical Research Institute of Sweden

Postal address Office location Phone / Fax / E-mail
SP Västeråsen +46 10 516 50 00
Box 857 Brinellgatan 4 +46 33 13 55 02
SE-501 15 Borås SE-504 62 Borås info@sp.se
SWEDEN SWEDEN

Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Results

The results only refer to the object specified in this document.

Table 1: Compilation of the results for luminance and decay time.

Sample ID	Luminance (mcd/m ²)					Decay time (min)
	2 min	10 min	30 min	60 min	120 min	
Sign, 150x300 mm	1675	318	92,6	41,5	18,1	4570

Table 2: CIE 1931 chromaticity coordinates for 2° standard observer. The colour denominations is according to Fig. 1 in DIN 67510-1:2001 (excitation – attenuation).

Sample ID	During excitation		During attenuation		Colour denomination
	x	y	x	y	
Sign, 150x300 mm	0,330	0,389	0,272	0,579	EW-K

Measuring uncertainty

The measuring uncertainty is $\pm 6\%$ of the measured luminance values and $\pm 0,005$ of the given values for x and y.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with EA Publication EA-4/02 (formerly EAL-R2). The long term stability of the calibrated object is not included in the reported expanded uncertainty of measurement.

Equipment

Xenon-lamp with D65-filter, SP inv.no 502959
 Luminance meter ERP-105, SP inv.no 602931
 Multimeter Keithley 2000, SP inv.no. 602550
 Aperture Ø 30 mm, SPL 834/93
 Luxmeter Hagner S2, SP inv.no 500305
 Photometer Spectrascan PR-705, SP inv.no 503130

SP Technical Research Institute of Sweden Measurement Technology, MTK

Mikael Lindgren
 Technical Manager

Stefan Källberg
 Technical Officer

Appendices

Picture of photoluminescent sign
 Measured luminance, table and diagram

Appendix 1

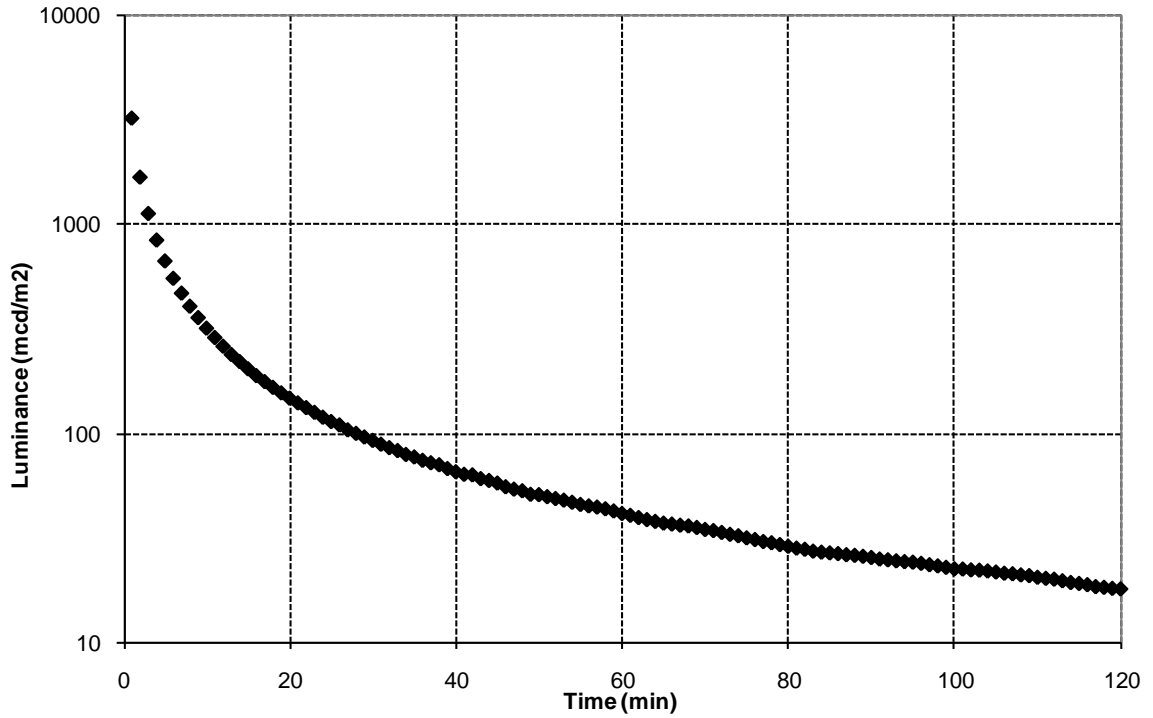
Picture of photoluminescent sign



X = measuring position

Appendix 2

Measured luminance after 5 minutes exposure at 1000 lux:



Time (min)	Measured luminance (mcd/m ²)	Time (min)	Measured luminance (mcd/m ²)
5	666	65	37,3
10	318	70	34,8
15	204	75	31,7
20	147	80	28,9
25	114	85	26,9
30	92,6	90	25,6
35	77,2	95	24,3
40	65,6	100	22,6
45	57,9	105	21,8
50	51,0	110	20,6
55	45,8	115	19,2
60	41,5	120	18,1