SLOVENSKI STANDARD
SIST EN 15886:2010

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Ohranjanje kulturne dediščine - Preskusne metode - Barvno merjenje površin

Conservation of cultural property - Test methods - Colour measurement of surfaces

Erhaltung des kulturellen Erbes - Prüfmethoden - Farbmessung von matten Oberflächen

Conservation des biens culturels - Méthodes d'essai - Mesurage chromatique des surfaces

Ta slovenski standard je istoveten z: **EN 15886:2010**

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
97.195	Umetniški in obrtniški izdelki	Items of art and handicrafts

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Conservation of cultural property - Test methods - Colour measurement of surfaces

Conservation des biens culturels - Méthodes d'essai - Mesurage chromatique des surfaces

Erhaltung des kulturellen Erbes - Prüfmethoden - Farbmessung von matten Oberflächen

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Contents

Page

Foreword

This document (EN 15886:2010) has been prepared by Technical Committee CEN/TC 346 “Conservation of cultural property”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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1 Scope

This European Standard describes a test method to measure the surface colour of porous inorganic materials, and their possible chromatic changes. No reference to the appearance of glossy surfaces is described. The method may be applied to porous inorganic materials either untreated or subjected to any treatment or ageing.

The method is suitable for the measurement of colour coordinates of:

— representative surfaces of specimens, see 3.11;

— representative surfaces of objects, indoors or outdoors.

2 Normative references

The following referenced documents are required for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced documents (including any amendments) apply.

prEN 15898:2010, *Conservation of cultural property — Main general terms and definitions concerning conservation of cultural property*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15898:2010 and the following apply.

3.1
porous inorganic materials
natural stones as well as artificial materials such as mortar, plaster, brick and others

3.2
chroma
attribute of colour used to indicate the degree of departure of the colour from a grey of the same lightness

NOTE See ASTM E 284.

3.3
lightness
attribute by which a perceived colour is judged to be equivalent to one of a series of greys ranging from black to white

NOTE See ASTM E 284.

3.4
hue
attribute of a visual perception according to which an area appears to be similar to one of the colours, red, yellow, green, and blue, or to a combination of adjacent pairs of these colours considered in a closed ring

NOTE See the International Commission on Illumination CIE (1931)

3.5
reflectance factor
R%
percentage ratio of the reflected radiant power compared to incident radiant power

3.6
CIE standard illuminant D65
reference illuminant having approximately the same relative spectral power distribution of a phase of daylight with a correlated colour temperature of approximately 6 500 K

3.7
CIE XYZ trichromatic system
system for colour measurement established in 1931 by the International Commission on Illumination CIE (1931)

NOTE The interpretation of numerical data is connected directly to visual perception. It is based on the principle that colours are obtained by mixing together the three imaginary colour as primaries defined X, Y, Z. These primaries define the reference frame in the tristimulus space and any set (X,Y,Z) is a vector in this space. The principal property of the reference frame is that the Y component is the luminance factor, generally given on a percentage scale.

3.8
CIE 1931 standard colorimetric observer
average observer whose colour matching properties correspond to the CIE colour matching functions for the 2° field size

3.9
CIE 1964 standard colorimetric observer
average observer whose colour matching properties correspond to the CIE colour matching functions for the 10° field size

3.10
CIE L*a*b* colour space 1976
mathematical transformation of the CIE XYZ space into a metric space

NOTE 1 See Figure 1.

NOTE 2 The L*a*b* system is useful for calculations of colour differences because it allows them to be defined by numerical values.

NOTE 3 In the CIE L*a*b* colour space the colour coordinates in this rectangular coordinate system are:

— **L*** - the **lightness** coordinate. The scale for L* ranges from 0 (black) to 100 (white);

— **a*** - the **red/green** coordinate, with +a* indicating redness and -a* indicating greenness;

— **b*** - the **yellow/blue** coordinate with +b* indicating yellowness and -b* indicating blueness.

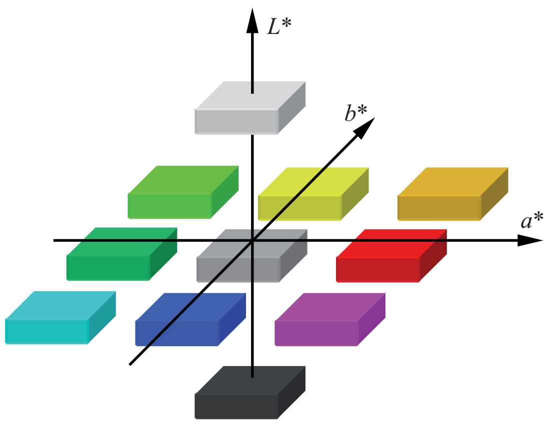

Figure 1 — L*a*b* colour space

3.11
specimen
part considered representative of the material constituting an object.

NOTE 1 The specimen can have different origins and can be taken from:

— materials similar to those constituting the object under study (e.g. stone quarries);

— reference materials, for instance, specifically prepared comparative materials.

NOTE 2 The number and dimension of the specimens can be different depending on difficulties encountered in sampling the required amount of material.

4 Principle

The method is based on the determination of the colour of a surface with an instrumental quantification of colour, expressed numerically according to international methods defined by the International Commission on Illumination CIE. The colours are represented in a "colour space", where any colour in the visible range is defined by three coordinates.

5 Test equipment

5.1 General

Common instruments used for colour measurement are tristimulus colorimeters or reflectance spectrophotometers characterized by:

— spectral range: 380 nm to 780 nm;

— acquisition data at least every 10 nm;

— CIE standard illuminant: D65 (recommended), A, C;

— CIE standard colorimetric observer: 2° and 10° (recommended);

— reference system colour space: CIE x,y,Y and L*a*b*[1)].

It is recommended that the instrument geometry conforms to the d/8° illumination and viewing condition specified by the CIE, where the illumination is diffused with the specular component excluded. Use of other geometries, such as 0/d, is also allowed. The test report shall specify the geometry used.

5.2 White object colour stimulus

For the calculation of L* a* b* values, the white reference shall be constituted by a perfect reflecting diffuser illuminated by the same light source as the tested specimen and/or object.

1) Usually the instruments available on the market are equipped with a software, which calculates the colorimetric parameters CIE x,y,Y and L*,a*,b* from the reflectance values. Otherwise these parameters can be calculated using the CIE Tables.

6 Colour measurement of specimens

6.1 Test areas of specimens

The tested surface areas shall be representative of the colour of the material under investigation. On inhomogeneous materials, the number of measurement points shall be adapted to the specimen as to obtain statistically representative values. Specimens shall be large enough to extend beyond the measurement area of the instrument.

6.2 Number of specimens

A minimum of five representative specimens is considered suitable. However, if only a limited number of specimens are available, the most representative specimen(s) shall be used.

6.3 Preparation of specimens

The specimens shall be conditioned in equilibrium with the surrounding environment. Temperature (T) and Relative Humidity (RH) should be recorded.

The surface of the specimens to be measured shall, if strictly necessary, be smoothed with sand paper with grain size of 82 µm (corresponding to grit number P180 according to the FEPA[2] classification) and wiped with a soft brush, bearing in mind that such action may alter the colour of the surface prior to measurement.

Measurements taken before and after treatment shall be performed under the same environmental conditions.

7 Colour measurement of indoor and outdoor objects

The area of measurement is the section of the surface of the object on which the colour measurements are carried out. The surface to be measured should, as far as practicable, be smooth and flat so as exclude external light from the area of measurement. Where no smooth, flat areas are available, this should be noted in the report.

Sand paper shall not be used to smooth the surface of an object.

Environmental parameters should, as far as is practicable, be reproduced when measurements are made. Relevant environmental conditions, including temperature and humidity should be recorded in the report. Colour measurements before and after treatment, and any subsequent measurement, should be carried out under the same environmental conditions.

8 Test method

8.1 General

The surface to be measured shall be representative of the specimen and the object as a whole. The number of measurement points shall be adapted to the specimen or the object as to obtain statistically representative values.

2) FEPA – Federation of European Producers of Abrasives.