SLOVENSKI STANDARD
SIST EN 12373-12:2002

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Aluminij in aluminijeve zlitine - Anodizacija - 12. del: Merjenje znaļilnic odbojnosti aluminijevih povrģin z napravami z integriranimi kroglicami

Aluminium and aluminium alloys - Anodizing - Part 12: Measurement of reflectance characteristics of aluminium surfaces using integrating-sphere instruments

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 12: Messung der Reflexionseigenschaften von Aluminiumoberflächen mit Hilfe Ulbrichtscher Kugeln

Aluminium et alliages d'aluminium - Anodisation - Partie 12: Mesurage des caractéristiques de réflectivité des surfaces d'aluminium a l'aide d'instruments intégrateurs sphériques

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77.120.10	Aluminij in aluminijeve zlitine	Aluminium and aluminium alloys

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Aluminium and aluminium alloys - Anodizing - Part 12: Measurement of reflectance characteristics of aluminium surfaces using integrating-sphere instruments

Aluminium et alliages d'aluminium - Anodisation - Partie 12: Mesurage des caractéristiques de réflectivité des surfaces d'aluminium à l'aide d'instruments intégrateurs sphériques

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 12: Messung der Reflexionseigenschaften von Aluminiumoberflächen mit Hilfe Ulbrichtscher Kugeln

This European Standard was approved by CEN on 27 July 2000.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 132 "Aluminium and aluminium alloys", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 2001, and conflicting national standards shall be withdrawn at the latest by February 2001.

It is based upon ISO 6719:1986.

EN 12373, Aluminium and aluminium alloys — Anodizing, comprises the following parts:

Part 1: Method for specifying decorative and protective anodic oxidation coatings on aluminium

Part 2: Determination of mass per unit area (surface density) of anodic oxidation coatings – Gravimetric method

Part 3: Determination of thickness of anodic oxidation coatings – Non-destructive measurement by split beam microscope

Part 4: Estimation of loss of absorptive power of anodic oxidation coatings after sealing by dye spot test with prior acid treatment

Part 5: Assessment of quality of sealed anodic oxidation coatings by measurement of admittance

Part 6: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution without prior acid treatment

Part 7: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution with prior acid treatment

Part 8: Determination of the comparative fastness to ultra-violet light and heat of coloured anodic oxidation coatings

Part 9: Measurement of wear resistance and wear index of anodic oxidation coatings using an abrasive wheel wear test apparatus

Part 10: Measurement of mean specific abrasion resistance of anodic oxidation coatings using an abrasive jet test apparatus

Part 11: Measurement of specular reflectance and specular gloss of anodic oxidation coatings at angles of 20°, 45°, 60° or 85°

Part 12: Measurement of reflectance characteristics of aluminium surfaces using integrating-sphere instruments

Part 13: Measurement of reflectivity characteristics of aluminium surfaces using a

Part 14: Visual determination of image clarity of anodic oxidation coatings – Chart scale method

Part 15: Assessment of resistance of anodic oxidation coatings to cracking by deformation

Part 16: Check for continuity of thin anodic oxidation coatings – Copper sulfate test

Part 17: Determination of electric breakdown potential

Part 18: Rating system for the evaluation of pitting corrosion – Chart method

Part 19: Rating system for the evaluation of pitting corrosion – Grid method

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of this European Standard specifies a method of measuring the total and diffuse luminous reflectance characteristics of aluminium surfaces, using integrating-sphere instruments.

The method described is applicable also to the measurement of specular reflectance (principal gloss value), specularity, and diffuseness.

The method is unsuitable for use with lighting reflectors.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For updated references the latest edition of the publication referred to applies (including amendments).

ISO 7724-2, Paints and varnishes - Colorimetry - Part 2: Colour measurement.
CIE 38:1977, Radiometric and photometric characteristics of materials and their measurement.[1]

3 Principle

The total and diffuse reflected light at different angles of incidence, close to the normal surface of a test specimen, are measured using an integrating-sphere reflectometer.

4 Apparatus

4.1 General

Reflectometer, suitable for measuring the reflectance of metallic surfaces, consisting of a suitable light source, an integrating sphere and a photometer comprising a photo-electric cell with a signal multiplier and recording, indicating, or computing equipment. Figures 1 to 3 show the optical systems of typical instruments.

The incident light beam is allowed to fall onto the specimen and is reflected into the sphere, the interior of which is white, where it is automatically integrated. The average light flux, as measured by the photometer, is a measure of the quantity of the reflected light.

The spectral product of the light source, spectral filters, and spectral response of the light detector shall closely simulate the spectral product of the CE source C (or D_{65}) and the spectral luminous efficiency $V(\lambda)$ for photopic vision, according to CIE 38:1977.

4.2 Geometrical specifications of the apparatus

4.2.1 Integrating sphere

The interior of the sphere, coated white and fitted with a device to permit measurement of reflectance, either including or excluding specular reflectance, serves to collect the reflected light flux.

Any diameter of sphere is satisfactory, provided that the total port area does not exceed 5 % of the total internal surface.

The internal surface shall be diffusing and of a highly reflective white for the whole of the visible spectrum. The entrance and specimen ports of the instrument shall be centred on the same great circle with more than 170° of arc between their centres. The specimen port shall subtend 8° ± 1° of arc in relation to the centre of the entrance port. The irradiating beam shall pass through the centreline of the entrance and specimen ports. A photometer shall be positioned on the sphere at 90° ± 0,5° from the entrance port.

4.3 Specular included (Q) and specular excluded (Q_d) determinations

4.3.1 Pivotable sphere

In the pivotable-sphere type of instrument (Figures 1 and 2), the sphere can turn about a vertical axis passing through the specimen port, rotating 9° ± 1° to provide for the measurements of specular included or total reflectance (Q) and specular excluded or diffuse reflectance (Q_d).

4.3.2 Fixed sphere (type 1)

In the fixed-sphere type 1 instrument, the specimen is held so that the incident beam falls on it at an angle of 9° ± 1° to the normal. A port, of the same dimensions as the entrance port, is provided in order to accept the specular reflection. Interchangeable caps are provided for this port, a black one to absorb the specular reflection for diffuse reflectance (Q_d) measurements and one coated with the same material as the inside of the sphere for total reflectance (Q) measurements.

4.3.3 Fixed sphere (type 2)

In the fixed-sphere type 2 instrument (see Figure 3), the sphere is fixed and only the specimen can be inclined. A wedge, as shown in Figure 3, designed to exclude ambient light, and white-coated like the sphere interior, allows adjustment of the angle of the specimen surface. For measurement of diffuse reflectance (Q_d), the specimen surface is adjusted to be perpendicular to the incident beam. For measurement of total reflectance (Q), the specimen surface is inclined at 9° ± 1° from the normal incident beam by insertion of the wedge.

4.4 Irradiating beam

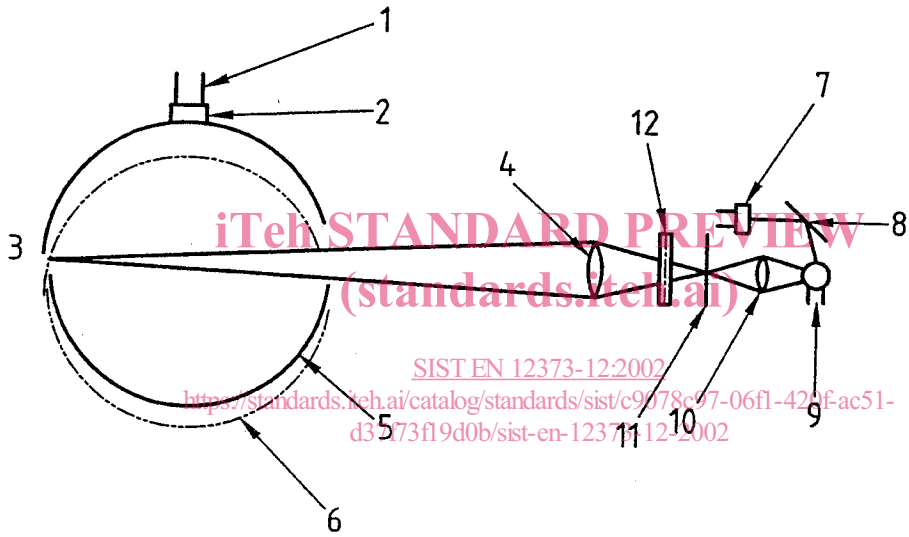
The light beam shall be substantially unidirectional with a maximum angle of any ray being less than 3° from the axis of the beam. It shall not be vignetted at either port.

The incident light beam shall have a circular cross-section concentric with the specimen port and shall have an annulus of 1,3° ± 0,1° subtended at the entrance port. On reflection from a first surface mirror, the specular-excluded beam shall be concentric with the centre of the port when the sphere is in the specular-excluded position. The mirror-reflected beam shall have a concentric circle with the port and shall have an annulus of 0,6° ± 0,2° subtended at the level of the exit port. The size of the exit port shall be not more than 0,1° greater than that of the annulus.

NOTE The dimensions of this beam can be most easily measured at a point beyond the sphere at a distance corresponding to the diameter of the integrating sphere, with no obstruction at either port. However, this will not ensure alignment when specularly reflected.

4.5 Housing

A housing shall be provided to prevent ambient light from entering the entrance port.



Key

1	To the amplifiers and recorders	7	Photoelectric cell for comparison
2	Photoelectric cell	8	Mirror
3	Test piece	9	Light source
4	Lens	10	Lens
5	0° incidence for diffused reflectance	11	Aperture
6	9° ± 1° incidence for total reflectance	12	Spectral filter

Figure 1 — Schematic optical plan of a typical pivotable sphere reflectometer (see 4.3.1)