SLOVENSKI STANDARD
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Aluminij in aluminijeve zlitine - Anodna oksidacija - 8. del: Primerjalno ugotavljanje obstojnosti barvnih anodnooksidiranih prevlek pri ultravijoliį ni svetlobi in toploti

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

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 8: Vergleichsbestimmung der Beständigkeit von gefärbten, anodisch erzeugten Oxidschichten gegen ultravioletes Licht und Wärme

Aluminium et alliages d'aluminium - Anodisation - Partie 8: Détermination de la solidité comparée a la lumiere ultraviolette et a la chaleur des couches anodiques colorées

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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
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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of an identical text or by endorsement, at the latest by May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

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.

It is based upon ISO 6581 : 1980.

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 goniophotometer or an abridged goniophotometer

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

Introduction

The test described in this standard represents severe exposure to ultra-violet light and, because of its severity, provides a very rapid determination of the comparative light-fastness of coloured anodic oxidation coatings.

It has to be realized, however, that the light emitted by the mercury vapour source used in the test has a discontinuous spectrum and a high content of ultra-violet radiation. Care should therefore be taken in comparing the results of this test with the results of exposure to sunlight.

Considerable heat is generated by the light source and the test needs to be carried out in such a way that the temperature of the test pieces during the test does not exceed 100 °C.

1 Scope

This Part of this European Standard specifies a comparative method for the determination of the fastness of coloured anodic oxidation coatings to ultra-violet light and heat.

The method is not suitable for testing coloured anodic oxidation coatings that are heat sensitive.

NOTE: Dark coloured test pieces will normally reach the highest temperatures.

2 Principle

Test pieces are exposed to ultra-violet light and the colour changes taking place are observed and compared with standard or control specimens.

3 Apparatus

3.1 General

The apparatus consists of a cabinet made from suitable heat-resistant material with a source of ultra-violet light and an arrangement of specimen holders or supports placed at an equal distance from the light source.

3.2 Cabinet

The cabinet shall be designed so that all exposed test pieces can be positioned at equal distances from the lamp.

NOTE: A cylindrical cabinet with the lamp placed vertically in the centre, or a cabinet of rectangular cross-section with the lamp placed horizontally above a support on which the test pieces are placed, is suitable.

Increasing the test temperature increases the rate of fading of the test pieces and their surface temperature in the test cabinet shall not be allowed to exceed 100 °C during any part of the test. In some cases, this will require the cabinet and test pieces to be cooled by means of a suitable fan. Care shall be taken to avoid over-cooling the lamp itself as this may affect the arc, and the lamp manufacturer's advice on this aspect should be followed.

WARNING NOTE : The cabinet shall be totally enclosed or suitably baffled to eliminate any possibility of ultra-violet light escaping, since certain ultra-violet wavelengths can damage the eyes. A micro-switch shall be fitted to the opening part of the cabinet such that the light source is automatically switched off when the cabinet is opened.

Many ultra-violet light sources produce ozone under the conditions of test (see 3.3) and this can also constitute a health hazard. If ozone is produced by the action of the lamp, it is desirable to have forced air circulation and it is essential that the air from the cabinet is ducted to a point outside the building. If in doubt, consult the manufacturer.

3.3 Ultra-violet light source

The ultra-violet lamp shall be a medium pressure mercury arc-lamp with a silica envelope, controlled by a suitable transformer and switch.

The power of the lamp and its arc length shall be such that the approximate intensities shown in table 1 are recorded at a distance of 190 mm from its centre.

Table 1. Approximate UV light intensities at 190 mm from the centre of the lamp

Wavelength nm	**Intensity** µW/cm^2
254	500 to 150
265	800 to 400
297	600 to 400
303	1000 to 800
313	1350 to 1200
365	1500 to 1700
405	800 to 1000
436	1300 to 1600

NOTE: A convenient arrangement has been found to be a 500 W lamp with an effective arc length of 120 mm, placed at a distance of approximately 190 mm from the specimens.

Most lamps have a recommended life of about 1000 h and during use there will be a decrease in output, especially at wavelengths below 313 nm. It is therefore desirable to use an intensity regulator for the lamp, which will compensate, to some extent, for this decrease.
Care should be taken to avoid handling the silica envelope of the lamp as this can cause it to de-vitrify.

Although ozone has little effect on the test results, it is desirable that the lamp used does not produce ozone, as this avoids the necessity for ducting the air outside.

3.4 Specimen arrangement

The apparatus shall be arranged so that specimens can be placed in suitable holders or on a suitable support and are equidistant from the light source. Care shall be taken to ensure that the specimens are not shielded from the light source, by the supporting column for the lamp or by glass.

4 Procedure

4.1 General

Expose the specimens to ultra-violet light in the cabinet (3.2) until the colour change on either the test piece or the control specimen reaches a predetermined level, as agreed between anodizer and purchaser.

NOTE: The time of exposure required depends upon the apparatus used and the colour anodized finish being assessed. This test is severe by comparison with other light-fastness tests, and most colour anodized finishes will show significant colour changes in exposure times of less than 100 h.

In order to facilitate the detection of colour changes, partly mask the exposed surface of the specimens by a material opaque to ultra-violet light.

4.2 Control specimens

Because of the severity of the test and the fact that it is intended to be used for comparative purposes, it is preferable to use standard colour anodized specimens of known ultra-violet light resistance for control purposes. Expose any control specimens with the test pieces and partly mask these in a similar way.

4.3 Effect of ozone production

The presence of ozone has very little effect on the colour change of colour anodized specimens. However, if a light surface bloom forms on the surface of specimens tested in an ozone-containing atmosphere, remove this with a mild abrasive cleaner before specimen evaluation.

5 Expression of results

Record the exposure time required for the colour change of either the test piece and the control specimen to reach the predetermined level agreed between anodizer and purchaser.