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Anodizing of aluminium and its alloys — Accelerated test of light fastness of coloured anodic oxidation coatings using artificial light

Anodisation de l'aluminium et de ses alliages — Essai accéléré de solidité à la lumière artificielle des couches d'oxydation anodique colorées

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2135 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 2, *Organic and anodic oxidation coatings on aluminium*.

This third edition cancels and replaces the second edition (ISO 2135:1984), which has been technically revised.

Anodizing of aluminium and its alloys — Accelerated test of light fastness of coloured anodic oxidation coatings using artificial light

1 Scope

This International Standard specifies an accelerated test method for assessing the fastness, using artificial light, of coloured anodic oxidation coatings on aluminium and its alloys.

For evaluating light fastness on exterior exposure, only outdoor exposure under conditions comparable to actual service is completely satisfactory.

Accelerated testing is suitable as a quality-control test of coloured anodic oxidation coatings whose light-fastness number has already been established by means of outdoor exposure testing.

The method is applicable to coloured anodic oxidation coatings on aluminium and its alloys produced by any means and for any purpose.

However, the method is not suitable for the measurement of coloured coatings with a light-fastness number already established by means of outdoor exposure testing, and of less than 6.

2 Normative references

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

ISO 105-A02:1993, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 105-B01:1994, *Textiles — Tests for colour fastness — Part B01: Colour fastness to light: Daylight*

3 Principle

Exposure of anodized samples to artificial light and regular observations of any colour change by comparison with the grey scale in accordance with ISO 105-A02.

The apparatus and light source are first calibrated by exposing parts of coloured cloth samples having a light-fastness number of 6 on the European blue scale (see Note 1 and the second-last paragraph of Clause 7, and ISO 105-B01). The time of exposure is determined for these samples to show a colour change corresponding to grade 3 of the grey scale (about 25 % loss of colour). This length of time is defined as the exposure cycle for the apparatus (see Note 2 to Clause 7).

Coloured anodized specimens of unknown light fastness are then exposed under the same conditions as the standard cloth samples until they also show a colour change corresponding to grade 3 of the grey scale. The number of exposure cycles required to produce this colour deterioration is used to assign the light-fastness numbers of the specimens tested (see Clause 7).

4 Apparatus

For tests in artificial light, several types of apparatus fulfil the conditions stipulated in this International Standard (see also 6.1).

Suitable light sources are provided by a xenon arc lamp, or by a carbon arc lamp (either open frame or enclosed).

5 Preparation of specimen

In order to facilitate the detection of colour changes, partly cover the exposed surface of the test specimen by means of an opaque mask.

For colour anodized specimens, ensure that the surface to be exposed is clean and that any necessary cleaning does not damage the surface. Ensure that any residual sealing smut is removed before the test is carried out.

6 Procedure

6.1 Exposure conditions

Expose the specimens in such a way that they are equidistant from the light source, around which they revolve slowly in order to ensure an identical distribution of light on each sample.

Throughout the test, ensure that the temperature of a black panel does not exceed 50 °C. If agreed by the anodizer and the customer, 63 °C may be used.

Ensure that any instructions given by the manufacturer of the apparatus are conformed to.

6.2 Period of exposure

After calibrating the apparatus (see Clause 3), test the specimens for several exposure cycles until they show a colour change corresponding to grade 3 of the grey scale (about 25 % loss of colour). Record the number of exposure cycles required to produce this colour change.

The exposure cycle time for any given apparatus remains constant if

— the emission of light is constant (i.e. constant intensity of radiation),

— the temperature is constant,

— the distance between the light source and the specimens is constant, and

— the ambient conditions (humidity, etc.) are constant.

In general, these conditions will not hold over a long period of time and it is necessary to redetermine the exposure cycle period from time to time.

7 Expression of results

The light-fastness number is a function of the number of exposure cycles required to produce the appropriate colour change corresponding to grade 3 of the grey scale, and is indicated in Table 1.

If agreed by the anodizer and the customer, colour change may be determined by using a colour meter to measure the colour before and after exposure.

If the specimen has not faded after 16 cycles, the light-fastness number shall be expressed as “greater than 10”.

Table 1 — Light-fastness number as a function of number of exposure cycles

Number of exposure cycles to fade anodized specimen to grade 3 of the grey scale	Light-fastness number
1	6
2	7
4	8
8	9
16	10

NOTE 1 The standard 7 cloth samples of the European blue scale are not suitable for use in this test because their rate of fading is not proportional to the time of exposure.

In order to avoid differences in the performance of the standard 6 cloth samples from different manufacturers, the standards used should always come from the same manufacturer, if possible.

NOTE 2 Typical exposure cycle times of the standard number 6 cloth sample with apparatus designed for this test are about 300 h with a xenon arc lamp (see ISO 105-B02[1]) and 150 h with a carbon arc lamp.

8 Test report

The test report shall contain at least the following information:

a) a reference to this International Standard;

b) the type and identification of the product tested;

c) the type of apparatus used (xenon arc lamp or carbon arc lamp; either open frame or enclosed);

d) the results of the test (see Clause 7);

e) any deviation, by agreement or otherwise, from the procedure specified;

f) the date of the test.

Bibliography

[1] ISO 105-B02:1994, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*