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Anodizing of aluminium and its alloys — Determination of the comparative fastness to ultraviolet light and heat of coloured anodic oxidation coatings

*Anodisation de l'aluminium et de ses alliages — Détermination de la
solidité comparée à la lumière ultraviolette et à la chaleur des couches
anodiques colorées*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

ISO 6581 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 2, *Organic and anodic oxidation coatings on aluminium*.

This second edition cancels and replaces the first edition (ISO 6581:1980), which has been technically revised.

Introduction

The test described in this International Standard represents severe exposure to ultraviolet 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 ultraviolet radiation. Care must 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.

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Anodizing of aluminium and its alloys — Determination of the comparative fastness to ultraviolet light and heat of coloured anodic oxidation coatings

1 Scope

This International Standard specifies a comparative method for the determination of the fastness of coloured anodic oxidation coatings to ultraviolet (UV) 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 ultraviolet 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 ultraviolet 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 — The cabinet shall be totally enclosed or suitably baffled to eliminate any possibility of ultraviolet light escaping, since certain ultraviolet 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 ultraviolet light sources produce ozone under the conditions of testing (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 Ultraviolet light source

The ultraviolet lamp shall be a medium-pressure mercury arc-lamp with a silica envelope, controlled by a suitable transformer and switch. The lamp shall not be glass shielded, as this would eliminate most of the ultraviolet light.

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	1 000 to 800
313	1 350 to 1 200
365	1 500 to 1 700
405	800 to 1 000
436	1 300 to 1 600

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 1 000 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 devitrify.

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 ultraviolet light in the cabinet (see 3.2) until the colour change on either the test piece or the control specimen reaches a predetermined level, as agreed between the customer and the anodizer.