International Standard ISO 6581

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Anodizing of aluminium and its alloys — Determination of the fastness to ultra-violet light of coloured anodic oxide coatings

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

First edition — 1980-11-01

UDC 669.718.915 : 535.683 **Ref. No. ISO 6581-1980 (E)**

Descriptors : aluminium, aluminium alloys, anodizing, anodic coatings, colour fastness, ultraviolet radiation tests.

Price based on 2 pages

ISO 6581-1980 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6581 was developed by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in April 1979.

It has been approved by the member bodies of the following countries :

Austria	Italy	South Africa, Rep. of
Canada	Japan	Spain
Czechoslovakia	Netherlands	Sweden
France	Norway	Switzerland
Germany, F. R.	Poland	United Kingdom
Hungary	Portugal	USSR
India	Romania	Yugoslavia

The member body of the following country expressed disapproval of the document on technical grounds :

Australia

Anodizing of aluminium and its alloys — Determination of the fastness to ultra-violet light of coloured anodic oxide coatings

1 Scope

This International Standard specifies a comparative method for the determination of the fastness to ultra-violet light of coloured anodic oxide coatings.

2 Field of application

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

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

Considerable heat is also generated by the light source and the surface temperature of dark coloured specimens can reach 80 to 90 °C; it is not, therefore, suitable for testing coloured anodic oxide coatings that are heat-sensitive.

3 Principle

Exposure of specimens to ultra-violet light and observation of the changes taking place by comparison with standard or control specimens.

4 Apparatus

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

4.1 Cabinet

The cabinet shall be such that all exposed specimens can be disposed at equal distances from the lamp. 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 or which the specimens are placed, are suitable alternatives.

Increasing the test temperature also increases the rate of fading of the specimens.

The surface temperature of the specimens in the test cabinet shall not, therefore, be allowed to exceed 100 °C during any part of the test. In some cases, this may require the cabinet and specimens to be aircooled by means of a suitable fan. Care shall be taken to avoid over-cooling the lamp itself as this may damage the arc. Lamp manufacturers can give advice on this aspect.

Cautionary note — It shall be totally enclosed or suitably baffled to eliminate any possibility of the ultra-violet light escaping, as certain ultra-violet wavelengths can damage the eyes. A micro-switch shall be fitted to the opening part of the cabinet so 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 also 4.2) and this may 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.

4.2 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 lamp shall not be glass shielded, as this would eliminate most of the ultra-violet light.

The power of the lamp and its arc length should be such that the following approximate intensities are recorded at a distance of 190 mm from its centre :

Wavelength, nm	Intensity, µW/cm²
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

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 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 shall be taken to avoid handling the silica envelope of the lamp as this may 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. Such lamps are available from some suppliers.

4.3 Specimen arrangement

The apparatus shall be such that specimens can be placed in suitable holders or on a suitable support so that they are equidistant from the light source. Take care to ensure that the specimens are not shielded from the light source either by the supporting column for the lamp or by glass, as this would eliminate most of the ultra-violet light.

5 Procedure

The specimens shall be exposed to ultra-violet light in the cabinet until the colour change on either the test specimen or the control specimen reach a predetermined level.

5.1 Masking

The exposed surface of the specimens shall be partly masked by a material opaque to ultra-violet light in order to facilitate the detection of colour changes.

5.2 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. Such control specimens should be exposed with the specimens under test and should be partly masked in a similar way.

5.3 Effect of ozone production

The use of lamps which do or do not produce ozone has very little effect on the performance of colour anodized specimens. However, a light surface bloom sometimes forms on the surface of specimens tested in an ozone-containing atmosphere and this should be removed with a mild abrasive cleaner before specimen evaluation.

5.4 Time of exposure

The time of exposure required depends on the apparatus being used and the colour anodized finish being assessed. However, 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.

5.5 Test report

The following items are at least to be given :

a) a reference to the method used, i.e. the number of this International Standard or corresponding national standard;

b) the results and the method of expression used;

c) any unusual features noted during the determination;

d) any operation not included in this International Standard or regarded as optional.