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Anodizing of aluminium and its alloys — Visual determination of image clarity of anodic oxidation coatings — Chart scale method

Anodisation de l'aluminium et de ses alliages — Détermination de la netteté d'image sur couches anodiques — Méthode des échelles graduées

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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.

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 10215 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 10215:1992), which has been technically revised.

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Introduction

Estimation of the image clarity of anodic oxidation coatings on aluminium and its alloys is normally carried out visually by observing the clearness of an image on the surface. However, the image can be observed at various angles and can be confused with the gloss level of a surface; and while the degree of image clarity is mainly influenced by the clearness of the coating, it is also affected by image distortion caused by surface irregularities and the haziness of the coating layer. Standardized methods of determining image clarity are therefore required.

This International Standard specifies the use of a chart scale based on optical combs, together with a lightness scale to rank image clarity, and has been found to give good correlation with visual evaluation. A related International Standard (ISO 10216) specifies an instrumental method of measuring image clarity, also by using optical combs. The instrumental method provides a more accurate measurement of image clarity and should be used in cases of dispute.

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Anodizing of aluminium and its alloys — Visual determination of image clarity of anodic oxidation coatings — Chart scale method

1 Scope

This International Standard specifies a visual method for determining the image clarity of anodic oxidation coatings on aluminium and aluminium alloys, using a chart scale and a lightness scale, which are defined. The method can be applied only to flat surfaces that can reflect the image of the chart scale pattern.

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.

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ISO/TR 8125:1984, *Anodizing of aluminium and its alloys — Determination of colour and colour difference of coloured anodic coatings*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
image clarity
C_V
ability of the surface of an anodic oxidation coating to produce a clear image of an object reflected in the surface

NOTE In the method described in this International Standard, image clarity is represented by a symbol C_V and is expressed as a numerical unit which is calculated by taking into account the image clearness, the image distortion and the haze value (see Clause 8).

3.2
image clearness
C
limit of visual resolution of fine details of a chart scale when reflected by a surface, given by the grade number on the chart scale

NOTE Image clearness relies heavily on the roughness of the surface being measured, and the lower the roughness the clearer or sharper the image becomes, i.e. the nearer the surface becomes to a perfect mirror, the clearer the image becomes.

3.3
image distortion
I
degree of distortion of an image caused by the waviness of a surface, given by the grade number on the chart scale

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NOTE Image distortion depends on the evenness of the surface being measured. The distortion occurs because part of the incident light is reflected in a direction different from that of the bulk of the light due to an uneven surface. Even if the surface is mirror-finished, it will present a distorted image if waviness is present.

3.4
haze value
H_n
degree of opacity of the coating on a surface, expressed as a lightness unit

NOTE Haze represents the opacity or transparency of the coating layer. Poor transparency causes absorption and scattering of normally reflected light, thus reducing the clarity of the image.

4 Principle

The image clarity of an anodic oxidation coating is determined by visual estimation of three properties of the coating layer: image clearness, image distortion and haze. These properties are determined by evaluating the image of a chart scale on the test pieces.

5 Apparatus

5.1 Chart scale, as shown in Figure 1, comprising a translucent plastic film or glass on which a pattern of optical combs is arranged using black and white lines with a range of specified widths (Grades 1 to 11). The light transmittance of the dark lines should be virtually zero.

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The widths of the black lines, and the spaces between two adjoining black lines, for each grade, are the same and the lines are perfectly parallel. The lines for Grade 1 are the widest and those for Grade 11 are the narrowest. The widths of the lines for each grade are given in Table 1.

NOTE The widths of lines for Grades 1 to 7 form an arithmetical progression. The grades above Grade 7 are used for estimating comparatively high image clarity and Grades 7, 9 and 11 form a geometrical progression. Grade 8 is the median of Grades 7 and 9, and Grade 10 is the median of Grades 9 and 11.

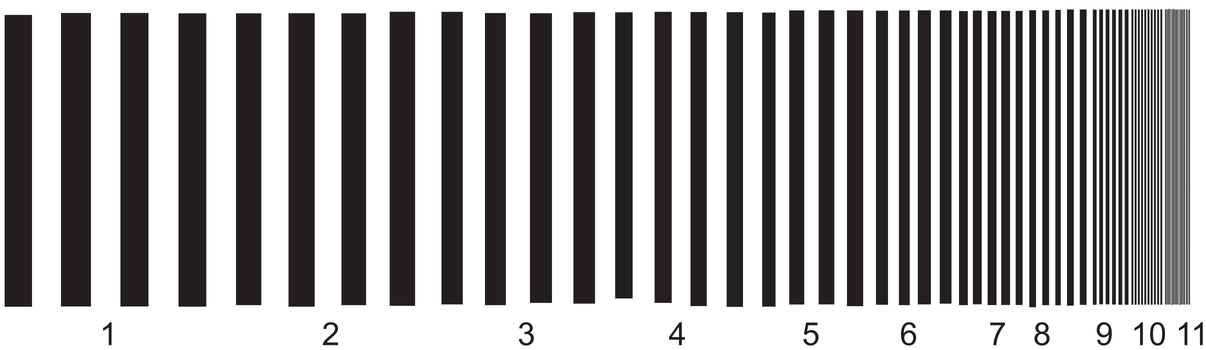

Figure 1 — Chart scale

Table 1 — Width of lines for each grade of the chart scale

Grade	1	2	3	4	5	6	7	8	9	10	11
Width, mm	2,0	1,75	1,5	1,25	1,0	0,75	0,5	0,375	0,25	0,188	0,125

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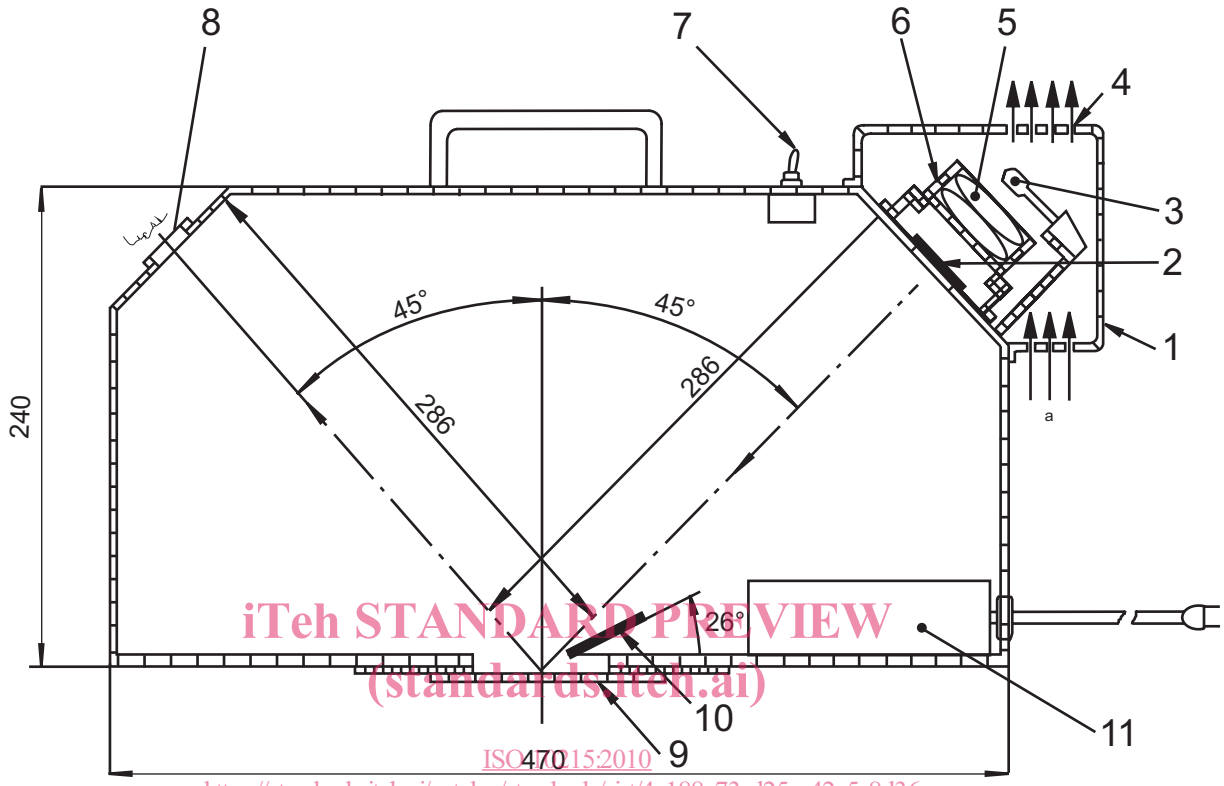
5.2 Observation box, as shown in Figures 2 and 3, which accommodates the chart scales used. It has a window in which the scale (Grades 1 to 11) may be set, and an observation window on the other side. The window for the test pieces is at the base of the box.

Dimensions in millimetres, unless otherwise indicated



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Key

1 lamp box
2 chart scale
3 source of white light
4 air vent
5 lens φ 39,5 mm, focus 50 mm × 2 mm
6 diffuser
7 power switch
8 observation window
9 test piece
10 lightness scale
11 power source

[a] Air.

Figure 2 — Diagram of a typical observation box

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