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Anodizing of aluminium and its alloys — Rating system for the evaluation of pitting corrosion — Chart method

Anodisation de l'aluminium et de ses alliages — Système de cotation de la corrosion par piqûres — Méthode reposant sur des images-types

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document 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 8993:2010), which has been technically revised. The main changes compared with the previous edition are as follows:

— rating numbers (RN) have been added to Table 1 and to Figures A.1 to A.8;

— a rating chart for designation A (RN 10) has been added to Figure A.1.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Anodizing of aluminium and its alloys — Rating system for the evaluation of pitting corrosion — Chart method

1 Scope

This document specifies a chart rating system based on standard charts that provides a means of defining levels of performance of anodic oxidation coatings on aluminium and its alloys that have been subjected to corrosion tests.

This rating system is applicable to pitting corrosion resulting from

— accelerated tests,

— exposure to corrosive environments, and

— practical service tests.

This document takes into account only pitting corrosion resulting from penetration of the protective anodic oxidation coating.

NOTE ISO 8994[1] describes a similar rating system based on defined grids.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7583, *Anodizing of aluminium and its alloys — Terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7583 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
corrosion pit
surface corrosion defect at which the anodic oxidation coating is penetrated

Note 1 to entry: Discoloration or other surface defects which do not penetrate the anodic coating do not count as corrosion pits.

4 Procedure for rating

4.1 Preparation of test specimen

A flat test specimen area of at least 5 000 mm^2 is necessary.

Use one of the following methods to remove corrosion products or deposits on the surface so that corrosion pits can be easily discerned as appropriate:

a) wipe with a slurry of fine pumice to abrade away corrosion products and dirt, then rinse in clean water and air dry;

or

b) dip for 5 min to 10 min in 30 % nitric acid, prepared by diluting 1 volume of concentrated nitric acid (ρ_{20} = 1,40 g/ml) with 1 volume of water at 20 °C to 25 °C; rinse and dry as indicated in a);

or

c) dissolve the anodic oxidation coating in a hot phosphoric acid/chromic acid mixture; rinse and dry as indicated in a) so that pitting in the aluminium substrate may be discerned;

NOTE 1 ISO 2106[2] describes the preparation and use of this reagent for the purposes of dissolution of the anodic oxidation coating.

NOTE 2 This method is particularly useful for dark-coloured anodic oxidation coatings.

WARNING — Chromium(VI) is toxic and shall be handled properly. Chromium(VI) solutions are hazardous to the environment and severely hazardous to waters.

or

d) wipe with soft textile gauze dipped in dilute hydrochloric acid solution (100 ml of 35 % to 37 % HCl, made up to 1 000 ml with distilled water or deionized water) to remove deposited copper, then rinse and dry as indicated in a).

4.2 Determination of chart rating

Select an area of at least 5 000 mm^2 on the significant surface of the test specimen.

NOTE A mask with an opening of 50 mm × 100 mm can be used to define the area to be evaluated.

Compare the size and frequency of corrosion pits on the cleaned significant surface with the rating charts in accordance with Figures A.1 to A.8. The rating charts show the maximum limit of corroded area for rating designation. The rating chart will be the chart designation which most closely resembles the corroded specimen. Disregard effects on the edges of test specimens. A rating of A indicates no visible corrosion, and a rating of H indicates the greatest degree of corrosion covered by this document.

A conversion of the chart rating and/or the rating number (RN) to percentage area of the significant surface covered by corrosion pits is indicated in Table 1.

Table 1 — Conversion of chart rating and rating number (RN) to percentage area covered by corrosion pits

Chart rating	Rating number (RN)	Percentage area of corrosion pits %
A	10	0,00 (None)
B1 B2 B3 B4 B5 B6	9,8	> 0,00 and ≤ 0,02
C1 C2 C3 C4 C5 C6	9,5	> 0,02 and ≤ 0,05
D1 D2 D3 D4 D5 D6	9,3	> 0,05 and ≤ 0,07
E1 E2 E3 E4 E5 E6	9	> 0,07 and ≤ 0,10
F1 F2 F3 F4 F5 F6	8	> 0,10 and ≤ 0,25
G1 G2 G3 G4 G5 G6	7	> 0,25 and ≤ 0,5
H1 H2 H3 H4 H5 H6	6	> 0,5