INTERNATIONAL STANDARD

ISO 3210

Fourth edition
2017-10

Anodizing of aluminium and its alloys — Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in acid solution(s)

Anodisation de l'aluminium et de ses alliages — Évaluation de la qualité des couches anodiques colmatées par mesurage de la perte de masse après immersion en solution(s) acide(s)

Reference number
ISO 3210:2017(E)

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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).

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For an explanation on 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 the following URL: 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 fourth edition cancels and replaces the third edition (ISO 3210:2010), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the option of using a test solution that does not contain hexavalent chromium ions (test solution B) has been added;

— a new subclause pertaining to the use of test solution B has been included in the procedure.

Anodizing of aluminium and its alloys — Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in acid solution(s)

1 Scope

This document specifies methods of assessing the quality of sealed anodic oxidation coatings on aluminium and its alloys by measurement of the loss of mass after immersion in acid solution(s).

It consists of the following two methods.

— Method 1: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in a phosphoric acid based solution without prior acid treatment.

— Method 2: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in a phosphoric acid based solution with prior acid treatment.

Method 1 is applicable to anodic oxidation coatings intended for decorative or protective purposes or where resistance to staining is important.

Method 2 is applicable to anodic oxidation coatings intended for outdoor architectural purposes. For less severe applications, Method 1 can be more suitable.

The methods are not applicable to the following:

— hard-type anodic oxidation coatings which normally are not sealed;

— anodic oxidation coatings that have been sealed only in dichromate solutions;

— anodic oxidation coatings produced in chromic acid solutions;

— anodic oxidation coatings that have undergone treatment to render them hydrophobic.

NOTE 1 The methods assess the quality of hydrothermal sealing applied to anodized aluminium. They can be appropriate for other sealing methods.

NOTE 2 The methods are destructive and can serve as reference methods in case of doubt or dispute regarding the results of the test for loss of absorptive power (see ISO 2143) or the measurement of admittance (see ISO 2931).

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 apply.

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

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

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

4 Principle

An unsealed anodic oxidation coating on aluminium is dissolved rapidly by acid media, whereas a well-sealed coating will withstand long immersion without appreciable attack.

The methods are surface specific. They test the resistance of the surface of a sealed anodic oxidation coating to attack by certain acid solutions. They do not test the quality through the whole thickness of the coating.

5 Reagents

5.1 General

Use only reagents of recognized analytical grade and distilled water or deionized water.

5.2 Predip solution, used only for Method 2

Aqueous solution containing (470 ± 15) g/l nitric acid.

NOTE This solution can be obtained, for example, by diluting a 65 % nitric acid solution (ρ_{20} = 1,40 g/ml) with an equal volume of water.

5.3 Test solution

5.3.1 Test solution A

Aqueous solution containing per litre, 35 ml of phosphoric acid (ρ_{20} = 1,7 g/ml) and 20 g of chromium(VI) oxide.

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

5.3.2 Test solution B

Aqueous solution containing per litre, 35 ml of phosphoric acid (ρ_{20} = 1,7 g/ml).

6 Apparatus

Usual laboratory apparatus and glassware together with a laboratory balance with a readability of 0,1 mg.

7 Preparation of test specimen

Cut a piece from the material to be tested, avoiding contact areas, such that there is an area of approximately 1 dm^2, but not less than 0,5 dm^2, of significant surface area. Normally, the mass of the test specimen should not exceed 200 g.

For hollow extrusions, take the test specimen from the end of the sections where the total (external plus internal) surface area has an anodic oxidation coating (due to the throwing power of the anodizing electrolyte).