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# International Standard



# 3210

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

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## Anodizing of aluminium and its alloys — Assessment of quality of sealed anodic oxide coatings by measurement of the loss of mass after immersion in phosphoric-chromic acid solution

iTeh STANDARD PREVIEW

*Anodisation de l'aluminium et de ses alliages — Évaluation de la qualité des couches anodiques colmatées par mesurage de la perte de la masse après immersion en solution phosphochromique.*

Second edition — 1983-12-15

[ISO 3210:1983](#)

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**Descriptors** : aluminium, aluminium alloys, surface treatment, anodic coating, quality control, tests, chemical tests, acid resistance tests, mass losses.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (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 authorized 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 3210 was developed by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in July 1982.

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

Australia  
Austria  
China  
Czechoslovakia  
Egypt, Arab Rep. of  
France  
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Hungary  
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Italy  
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Romania  
South Africa, Rep. of  
Spain  
Sweden  
United Kingdom  
USA  
USSR

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

Netherlands

This second edition cancels and replaces the first edition (i.e. ISO 3210-1974).

# Anodizing of aluminium and its alloys — Assessment of quality of sealed anodic oxide coatings by measurement of the loss of mass after immersion in phosphoric-chromic acid solution

## 1 Scope

This International Standard specifies a method for assessing the quality of sealed anodic coatings on aluminium and its alloys by measurement of the loss of mass after immersion in phosphoric-chromic acid solution.

## 2 Field of application

This International Standard specifies a referee method to be used to assess the quality of sealed coatings.

The method is applicable to anodic coatings intended for exposure to the weather, or for protective purposes in corrosive media, and where resistance to staining is important.

The method is not applicable to

- hard-type anodic coatings which normally are not sealed;
- anodic coatings that have been sealed only in dichromate solutions;
- anodic coatings that have undergone a treatment to render them hydrophobic.

The method is destructive and may serve as a referee method in case of doubt or dispute regarding the results of the test of loss of absorptive power (see ISO 2143).

## 3 Reference

ISO 2143, *Anodizing of aluminium and its alloys — Estimation of loss of absorptive power of anodic oxide coatings after sealing — Dye spot test with prior acid treatment.*

## 4 Principle

The test is based upon the observation that an unsealed coating of aluminium oxide is rapidly dissolved in acid media, whereas a well-sealed coating of aluminium oxide withstands long immersion without appreciable attack.

## 5 Reagents

The reagents used shall be of recognized analytical grade. The water used shall be distilled or deionized water.

**5.1 Phosphoric acid** ( $\rho_{20} = 1,7$  g/ml).

**5.2 Chromium(VI) oxide.**

## 6 Apparatus

Ordinary laboratory apparatus and

**6.1 Laboratory balance**, capable of weighing to an accuracy of 0,1 mg.

## 7 Preparation of test piece

From the material to be tested, cut a test piece such that there is an area of about 1 dm<sup>2</sup> (minimum 0,5 dm<sup>2</sup>) of significant surface area. Normally, its mass should not exceed 200 g.

On hollow extrusions, take the sample from the end of the sections where the total surface area has an anodic coating due to the throwing power of the anodizing electrolyte.

NOTE — In special cases (certain types of jiggings, small hollow sections, etc.), it will be necessary to remove the anodic oxide coating from the inside surface and to carry out the test on the coating on the outer surface of the extrusion.

## 8 Procedure

**8.1 Measure the total coated area of the test piece** (excluding cut edges and other uncoated surfaces).

NOTE — The test solution does not attack bare metal; hence, it is unnecessary to take bare surfaces into account.

Remove any surface bloom from the test piece by rubbing with a dry cloth.

**8.2 Degrease the test piece** in a suitable organic solvent at room temperature according to the method described in clauses A.1 and A.2 of the annex.

**WARNING NOTE — This operation should be carried out in a well-ventilated hood to prevent inhalation of the solvent vapour.**

**8.3** Then dry the test piece thoroughly and immediately weigh it to the nearest 0,1 mg (mass  $m_1$ ).

**8.4** Completely immerse the test piece standing upright in a aqueous solution containing per litre,

35 ml of phosphoric acid (5.1);

20 g of crystallized chromium(VI) oxide (5.2).

Leave there for exactly 15 min at a constant temperature of  $38 \pm 1$  °C.

NOTE — Uniformity of the temperature within the solution is very important. This may be achieved by using a water-bath or by continuously stirring.

The test solution may be re-used but shall be discarded after 10 dm<sup>2</sup> of anodized surface have been treated per litre of solution. Do not use test solution which has been in contact with materials other than anodized aluminium and its alloys.

**8.5** Take the test piece from the solution and rinse thoroughly first under running water and then in deionized or distilled water. Then dry it as indicated in the annex and immediately weigh it to the nearest 0,1 mg (mass  $m_2$ ).

**8.6** During all operations 8.2 to 8.5, avoid touching the test piece with bare hands.

Take extreme care that the two drying operations in 8.3 and 8.5 are always carried out in the same reproducible way. Avoid heating to temperatures above 60 °C.

## 9 Expression of results

The loss in mass per surface area,  $q_A$ , expressed in milligrams per square decimetre, is given by the equation

$$q_A = \frac{m_1 - m_2}{A}$$

where

$m_1$  is the mass, in milligrams, of the test piece before immersion;

$m_2$  is the mass, in milligrams, of the test piece after immersion;

$A$  is the surface area, in square decimetres, in contact with the solution, excluding the edges.

The maximum permissible loss in mass for the coating under test shall be subject to agreement between the interested parties.

## 10 Test report

The test report shall contain at least the following information:

- a) the type and identification of the product tested;
- b) the reference to this International Standard;
- c) the result of the test;
- d) any deviation, by agreement or otherwise, from the procedure specified;
- e) the date of the test.

## Annex

### Suggested method for drying of samples before and after acid treatment

**A.1** After degreasing the test piece by gentle agitation for 30 s in a suitable organic solvent at room temperature, leave for 5 min in the surrounding atmosphere (pre-drying) and then place in a drying oven preheated to 60 °C and leave for exactly 15 min with the anodized surfaces standing upright.

**WARNING NOTE** — In the case where chlorinated solvents are used, carry out the degreasing operation in perchloroethylene and the pre-drying in a well-ventilated hood to prevent inhalation of the solvent vapour.

**A.2** Allow the test piece to cool down for 30 min above silica gel in a closed desiccator.

**A.3** After the acid treatment and thorough rinsing, repeat the operations A.1 and A.2 in exactly the same way but omitting the use of organic solvent.

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