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**Anodizing of aluminium and its alloys —  
Estimation of loss of absorptive power of  
anodic oxidation coatings after sealing —  
Dye-spot test with prior acid treatment**

*Anodisation de l'aluminium et de ses alliages — Appréciation de la  
perte du pouvoir absorbant des couches anodiques après colmatage —  
Essai à la goutte de colorant avec action acide préalable*



Reference number  
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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 2143 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 2143:1981), which has been technically revised.

## Introduction

The resistance of anodic oxidation coatings to the absorption of dyes can give information on the quality of sealing, the total resistance indicating that the quality of sealing is good. A slight loss of resistance to absorption, however, does not necessarily mean that the sealing of the coating is poor; it may be a consequence of certain agents having been added to the sealing bath. In cases of doubt, the quality of sealing can be established using a reference method such as that those described in ISO 3210.

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# Anodizing of aluminium and its alloys — Estimation of loss of absorptive power of anodic oxidation coatings after sealing — Dye-spot test with prior acid treatment

**IMPORTANT** — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

## 1 Scope

This International Standard specifies a method of estimating the loss of absorptive power of anodic oxidation coatings that have undergone a sealing treatment, by dye absorption after acid pretreatment.

The method is suitable for use as a production control method and is applicable to anodic oxidation coatings which may be subjected to weathering or aggressive environments, or where resistance to staining is important.

The method is not applicable to those coatings that:

- a) are formed on alloys containing more than 2 % copper or 4 % silicon;
- b) are sealed by the dichromate process;
- c) have been given supplementary processing, e.g. oiling, waxing or lacquering;
- d) are coloured in deep shades;
- e) are less than 3  $\mu\text{m}$  thick.

The method is less appropriate where nickel or cobalt salts, or organic additives, have been added to the sealing bath.

## 2 Principle

A degreased area of sample is subjected to the action of an acid and the coloration obtained after the subsequent application of a dyestuff is observed.

## 3 Reagents

### 3.1 General

Use only reagents of recognized analytical grade and distilled water or deionized water. The acid solutions specified in 3.2.1 and 3.2.2 may be used equally for either dye-spot test, but the acid solution specified in 3.2.2 is preferred for safety reasons.

## 3.2 Acid solutions

**WARNING** — These acid solutions contain hydrofluoric acid, and should be stored in appropriate containers and handled with care.

### 3.2.1 Acid solution A

Solution containing 25 ml of sulfuric acid ( $\rho_{20} = 1,84$  g/ml) and 10 g of potassium fluoride per litre.

### 3.2.2 Acid solution B

Solution containing 25 ml of fluorosilicic acid ( $\text{H}_2\text{SiF}_6$ ) ( $\rho_{20} = 1,29$  g/ml) per litre.

## 3.3 Dye solutions

### 3.3.1 Dye solution A

Aqueous solution containing 5 g of Sanodye Blue 2LW formerly Sanodal Blue 2LW (Colour Index Mordant Blue 69) per litre, adjusted, at approximately 23 °C, to a pH of  $5,0 \pm 0,5$  with dilute sulfuric acid solution or with dilute sodium hydroxide solution.

### 3.3.2 Dye solution B

Aqueous solution containing 10 g of Sanodal Red B3LW (Colour Index Acid Red 331) per litre, adjusted, at approximately 23 °C, to a pH of  $5,7 \pm 0,5$  with dilute sulfuric acid solution or with dilute sodium hydroxide solution.

## 4 Test specimens

The test shall normally be carried out using production articles.

**NOTE** The use of specially prepared test specimens, processed at the same time and in the same manner as production articles, can lead to erroneous results.

## 5 Procedure

Clean the surface to be tested, removing any grease with a piece of cotton wool soaked in, for example, acetone or ethanol 96 %.

Apply one drop of acid solution A (3.2.1) or acid solution B (3.2.2), at approximately 23 °C, to the horizontal, clean, dry surface and allow it to remain for 1 min.

Remove the drop of acid solution and wash and dry the test surface.

Apply one drop of dye solution A (3.3.1) or dye solution B (3.3.2) to the spot treated previously with acid solution, and allow it to remain for 1 min.

Wash off the drop of dye and clean the surface of the test area thoroughly by rubbing with a clean cloth soaked in water and light abrasive, such as magnesia whiting or an equivalent abrasive, for 20 s. Rinse thoroughly and dry.

Examine the test area and assess the intensity of the stain by comparison with the examples illustrated in Annex A.



## 6 Expression of results

Express the loss of absorptive power in accordance with the classification given in Annex A, or as the intensity of the stain, as a numerical value, in accordance with Annex A.

## 7 Test report

The test report shall include at least the following information:

- a) a reference to this International Standard;
- b) the type and identification of the product tested;
- c) the anodizing specification (where known);
- d) the acid treatment used in the test (see 3.2.1 or 3.2.2);
- e) the colour of the dye solution used in the test (see 3.3.1 or 3.3.2);
- f) the loss of absorptive power, or intensity of the stain as a numerical value (see Clause 6);

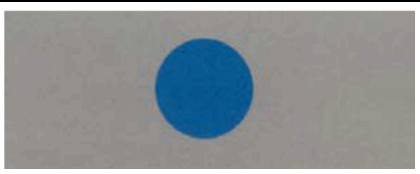



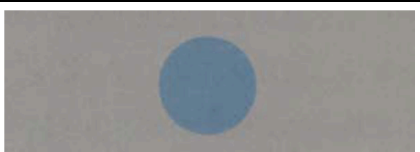
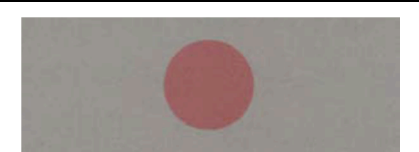


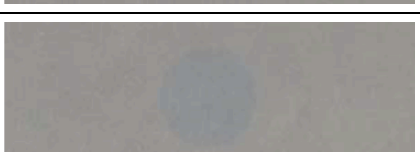
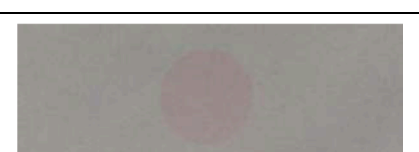
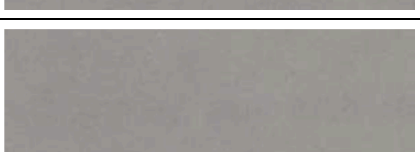
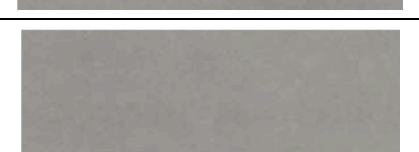
NOTE Acceptance levels are normally specified in the relevant product specification.

- g) any observations concerning the conduct of the test or the nature of the stained area (for example, uneven density of staining);
- h) the date of the test.

**Annex A**  
(normative)

**Interpretation of the results of the dye-spot test**

**Table A.1 — Interpretation of the results of the dye-spot test**

SANODYE BLUE 2LW	SANODAL RED B3LW	Intensity of the stain	Loss of absorptive power
		5	none
		4	very weak
		3	weak
		2	medium
		1	strong
		0	total

## Bibliography

- [1] ISO 3210, *Anodizing of aluminium and its alloys — Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution*

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