INTERNATIONAL STANDARD

ISO 4623-2

Second edition
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Paints and varnishes — Determination of resistance to filiform corrosion —

Part 2: Aluminium substrates

Peintures et vernis — Détermination de la résistance à la corrosion filiforme —

Partie 2: Subjectiles en aluminium

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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 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.

The committee responsible for this document is ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This second edition cancels and replaces the first edition (ISO 4623-2:2003), which has been technically revised. It also incorporates the Technical Corrigendum ISO 4623-2:2003/Cor 1:2005. The following main changes have been made:

a) duplicate determination has been changed to triplicate determination;

b) information on the shape of the scribe marks has been added;

c) the width of the scribe marks has been changed to be in line with EN 3665;

d) a note on using the CASS test for initiating filiform corrosion was added;

e) the supplementary test conditions previously in Annex A have been integrated in the test report.

ISO 4623 consists of the following parts, under the general title *Paints and varnishes — Determination of resistance to filiform corrosion*:

— *Part 1: Steel substrates*

— *Part 2: Aluminium substrates*

Introduction

A scribe mark cut through a coating of paints or varnishes on metal can give rise to various types of corrosion, such as blistering of the coating, corrosion of the metal under the coating as well as filiform corrosion. Filiform corrosion tends to develop under specific conditions of temperature and relative humidity and when traces of acids, bases or salts are present either under the paint coating or at breaks in the coating. These conditions are often found in marine and/or industrial environments. A certain amount of under-corrosion of the coating, starting from the scribe mark, will always occur. Filiform corrosion, however, is considered to be present only if the typical pattern in the form of threads is obvious.

Paints and varnishes — Determination of resistance to filiform corrosion —

Part 2: Aluminium substrates

1 Scope

This part of ISO 4623 describes a test procedure for assessing the protective action of coatings of paints or varnishes on aluminium against filiform corrosion arising from a scribe mark cut through the coating.

It is only suitable for assessing the performance of the coating/substrate combination tested. It is not suitable for predicting the performance of the coating on different substrates.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 1514, *Paints and varnishes — Standard panels for testing*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 4628-8, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect*

ISO 4628-10, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 10: Assessment of degree of filiform corrosion*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Terms and definitions

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

3.1
filiform corrosion
type of corrosion proceeding under a coat of paint, varnish or related product, in the form of threads, generally starting from bare edges or from local damage to the coating

Note 1 to entry: Usually the threads are irregular in length and direction of growth, but they may also be nearly parallel and of approximately equal length. They usually follow the extrusion direction and do not cross over one another. They need to be initiated by aggressive ions.

4 Principle

A coated test panel is scribed as defined in 9.2. A small amount of hydrochloric acid is introduced into the scribe mark through exposure to hydrochloric acid vapour. The panel is then exposed in a test cabinet at 40 °C and a relative humidity of 82 %. The effects of exposure are then evaluated by criteria agreed in advance between the interested parties; these criteria usually being either of a subjective nature or as given in ISO 4628-10.

5 Sampling

Take a representative sample of the product to be tested (or of each product in the case of a multi-coat system), as specified in ISO 15528.

Examine and prepare each sample for testing, as specified in ISO 1513.

6 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

6.1 Test cabinet, capable of being maintained at (40 ± 2) °C and a relative humidity of (82 ± 5) %. The cabinet shall have provision for maintaining the panels in a horizontal position (see Note) at least 20 mm apart or, if specified, provision for placing or hanging the test panels in an approximately vertical position so that the distance between the faces of adjacent panels is at least 20 mm.

NOTE Due to the hygroscopic action of the hydrochloric acid in the scribe mark, mixtures of water droplets and hydrochloric acid can be formed. Horizontal exposure will result in more corrosion which proceeds in a more regular manner along the length of each scribe mark.

6.2 Container, made of acid-resistant material, with a lid, and capable of holding the test panels at a distance of (100 ± 10) mm from the surface of the acid and at least 20 mm from each other.

6.3 Scribe tool, consisting of a sharp instrument which will produce scribe marks with the dimensions specified in 9.2 and with well-defined edges. There are many scribe tools available, and the result of the test will vary depending on the tool used. A description of the scribe tool shall be given in the test report [see Clause 12, item d)].

6.4 Ruler, accurate to 1 mm.

7 Reagents

7.1 Hydrochloric acid, of analytical grade, concentration 37 % (ρ = 1,19 g/cm^3).

The quality and purity of the hydrochloric acid shall be kept constant.

8 Test panels

8.1 Material and dimensions

The test panels shall be of aluminium complying with the requirements of ISO 1514 and of minimum dimensions 100 mm × 70 mm × 0,8 mm, unless otherwise specified, the short dimension being in the direction of rolling of the metal.

8.2 Preparation and coating

Prepare the test panels as described in ISO 1514, unless otherwise specified, and then coat them by the specified method with the product or system under test.

Unless otherwise specified, the back and edges of the panel shall also be coated with the product or system under test.

If the coating on the back and edges of the panel differs from that of the product under test, it shall have corrosion resistance greater than that of the product under test.

8.3 Drying and conditioning

Dry (or stove) and age (if applicable) each coated test panel for the specified time under the specified conditions, and, unless otherwise specified, condition them at the standard temperature and relative humidity defined in ISO 3270 for at least 16 h, with free circulation of air and without exposing them to direct sunlight. The test procedure shall then be carried out as soon as possible.

8.4 Thickness of coating

Determine the thickness, in micrometres, of the dried coating by one of the non-destructive procedures described in ISO 2808.

9 Procedure

9.1 Determination

Carry out all tests in triplicate unless otherwise agreed.

9.2 Scribing the test panels

Unless otherwise specified, make two scribe marks, each at least 30 mm long, on each test panel, making the scribe marks perpendicular to each other. The distance between the scribe marks and from the scribe marks to the edge of the panel shall be at least 20 mm (see Figure 1). The scribe marks shall be of width 1 mm to 2 mm (see Figure 2), unless otherwise agreed.

Remove the debris from the scribe marks. The coating shall be smooth at the edges of the scribe mark. Ensure that the metal is clearly visible over the entire length of the scribe marks by using a magnifying glass of ×10 magnification.

If the aluminium has surface cladding, then the scribe mark shall penetrate through the cladding layer by 0,05 mm to 0,1 mm (see Figure 2).

Different scribing devices produce different amounts of corrosion in the scribe mark, therefore the manner of scribing and the type of tool used shall be reported.