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**Paints and varnishes — Determination of  
resistance to filiform corrosion —**

**Part 1:  
Steel substrates**

*Peintures et vernis — Détermination de la résistance à la corrosion  
filiforme —  
Partie 1: Subjectiles en acier*

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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 3.

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 part of ISO 4623 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4623-1 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This first edition of ISO 4623-1 cancels and replaces ISO 4623:1984, of which it constitutes a minor technical revision.

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

- *Part 1: Steel substrates* <https://standards.iteh.ai/catalog/standards/sist/2fc1f5d2-3ceb-4ced-9344-d84afe614118/iso-4623-1-2000>
- *Part 2: Aluminium substrates*

Annex A forms a normative part of this part of ISO 4623. Annex B is for information only.

## Introduction

A scribed mark cut through a coating of paints or varnishes on steel can give rise to filiform corrosion. This corrosion tends to develop when the relative humidity is high and when traces of salts are present either under the paint coating or at breaks in the coating. A certain amount of under-rusting of the substrate, starting from the scribed mark, will always occur. Filiform corrosion, however, is considered to be present only if the typical pattern in the form of threads is obvious.

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# Paints and varnishes — Determination of resistance to filiform corrosion —

## Part 1: Steel substrates

### 1 Scope

This part of ISO 4623 is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

It describes a test procedure for assessing the protective action of coatings of paints or varnishes on steel against filiform corrosion arising from a scribed mark cut through the coating.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 4623. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 4623 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 483, *Plastics — Small enclosures for conditioning and testing using aqueous solutions to maintain relative humidity at constant value.*

ISO 1513, *Paints and varnishes — Examination and preparation of samples for testing.*

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

ISO 2409, *Paints and varnishes — Cross-cut test.*

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 3696, *Water for analytical laboratory use — Specification and test methods.*

ISO 4628-10, *Paints and varnishes — Evaluation of degradation of coatings — Part 10: Designation of intensity, quantity and size of common types of defect.*

ISO 7253, *Paints and varnishes — Determination of resistance to neutral salt spray (fog).*

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

### 3 Term and definition

For the purposes of this part of ISO 4623, the following term and definition apply.

#### 3.1

##### **filiform corrosion**

a 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 Usually the threads are irregular in length and direction of growth, but they may also be nearly parallel and of approximately equal length.

NOTE 2 Filiform corrosion can also occur under other protective coatings.

### 4 Principle

A coated test panel is scribed in a defined way. A small amount of sodium chloride is introduced into the scribed mark, either by dipping the panel in a solution of the salt or by exposure to salt-fog. The panel is then exposed in a test cabinet at 40 °C and a relative humidity of 80 %. The effects of exposure are evaluated by criteria agreed in advance between the interested parties, these criteria either being of a subjective nature or as given in ISO 4628-10.

### 5 Required supplementary information

For any particular application, the test method specified in this part of ISO 4623 needs to be completed by supplementary information. The items of supplementary information are given in annex A.

### 6 Sampling

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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.

### 7 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

**7.1 Test cabinet**, capable of being maintained at  $(40 \pm 2)$  °C and a relative humidity of  $(80 \pm 5)$  %, and having 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 If a cabinet with automatic humidity control is not available, the specified humidity may be obtained by means of a saturated aqueous solution of ammonium sulfate. This gives a constant relative humidity of 79 % at 40 °C (see ISO 483). Further details and guidance are given in annex B.

### 8 Reagents

#### 8.1 Sodium chloride solution (for the dipping technique).

Unless otherwise specified, prepare the solution by dissolving 1 g of analytical grade sodium chloride in 1 litre of distilled or demineralized water of at least grade 3 as defined in ISO 3696. Place the solution in a vessel suitable for complete immersion of the test panel (see 9.1 and 10.3.2).



## 9 Test panels

### 9.1 Material and dimensions

The test panels shall be of burnished steel complying with the requirements of ISO 1514 and of minimum dimensions 150 mm × 75 mm × 0,3 mm, unless otherwise specified.

### 9.2 Preparation and coating

Prepare the test panels by burnishing 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 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 a corrosion resistance greater than that of the product under test.

### 9.3 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 conditions 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.

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### 9.4 Thickness of coating

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

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## 10 Procedure

### 10.1 Number of determinations

Carry out all tests in duplicate unless otherwise agreed.

### 10.2 Scribing the test panels

Unless otherwise specified, make two scribed marks at least 30 mm long on each test panel using a suitable tool (see note). Make the scribed marks perpendicular to each other and arranged in such a way that their distance from each other or from the edge of the panel is not less than 20 mm (see Figure 1). Ensure that the cutting edge completely penetrates the coating. Remove the debris from the scribed marks. Ensure that the metal is clearly visible over the entire length of the scribed marks by use of a magnifying glass of ×10 magnification.

**NOTE** It has been found that the use of a mechanical scribing device gives a better scribe and has better repeatability than a hand-held scribing tool. The precise nature of the scribing tool is not critical provided that it produces a thin line with well-defined edges. A sharp blade such as the single-blade cutting tool defined in ISO 2409 has been found to be suitable.