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Metallic and other inorganic coatings — Electropolishing as a means of smoothing and passivating stainless steel

Revêtements métalliques et autres revêtements inorganiques — Polissage électrolytique comme procédé de lissage et de passivation des aciers inoxydables

Reference number
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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Information to be supplied by the purchaser to the finisher ... **2**
5 Requirements ... **2**
5.1 Visual defects ... 2
5.2 Process ... 3
5.2.1 General ... 3
5.2.2 Electropolishing ... 3
5.2.3 Post treatment and rinsing ... 3
5.3 Passivation testing ... 3
5.4 Test report ... 4
6 Sampling ... **4**
7 Test methods ... **4**
7.1 Water immersion test ... 4
7.2 Humidity test ... 4
7.3 Neutral salt spray test ... 4
7.4 Copper sulfate test ... 4
7.4.1 Principle ... 4
7.4.2 Reagents ... 5
7.4.3 Procedure ... 5
7.5 Modified “ferroxyl” test ... 5
7.5.1 Principle ... 5
7.5.2 Reagents ... 5
7.5.3 Procedure ... 5
8 Test report ... **5**
Annex A (informative) **Typical electropolishing solution and operating conditions** ... **7**
Bibliography ... **8**

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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.

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 document 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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This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 8, *Chemical conversion coatings,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 15730:2000), of which it constitutes a minor revision.

The main changes are as follows:

— the normative references, and the terms and definitions have been updated;

— editorial errors have been corrected.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Electropolishing removes a small but finite amount of metal from the surface that, in addition to smoothing and brightening, produces a hygienically clean surface desirable for use by manufacturers of food processing and medical equipment.

In addition to improved passivation, electropolishing provides many other benefits. Some examples are surface stress relief, removal of surface carbon and oxides and reduction of friction. Hydrogen embrittlement of articles is not produced during the electropolishing process, which takes minutes to perform.

The quality of passivation depends on the type of stainless steel, the formulation of the electropolishing solution and the conditions of operation. Free iron on the surface of the stainless steel is removed resulting in improved corrosion resistance. No further chemical treatment is necessary in order to passivate the stainless steel surface. Surface smoothing obtained by electropolishing also improves passivation.

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Metallic and other inorganic coatings — Electropolishing as a means of smoothing and passivating stainless steel

WARNING — The use of this document may involve hazardous materials, operations and equipment. This document does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices, and to determine the applicability of regulatory limitations prior to use. Large quantities of hydrogen and oxygen gases are evolved at the electrodes during the electropolishing process. Proper ventilation procedures should be used to ensure their removal. Ignition of hydrogen gas can result in dangerous explosions.

1 Scope

This document specifies the information to be supplied by the purchaser to the finisher, requirements and test methods for electropolishing as a means of smoothing and passivating stainless steel alloys in the S2XXXX, S3XXXX and S4XXXX series, and the precipitation hardened alloys (see ISO 15510 for information on composition).

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 2064:1996, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness*

ISO 2080:2022, *Metallic and other inorganic coatings — Surface treatment, metallic and other inorganic coatings — Vocabulary*

ISO 4519:1980, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 16348, *Metallic and other inorganic coatings — Definitions and conventions concerning appearance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2064, ISO 2080 and ISO 4519 and the following apply.

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

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

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

3.1
passivation
rendering of a stainless steel surface into a lower state of chemical reactivity

Note 1 to entry: Passivated surfaces are characterized by the absence of free iron and the formation of a thin coherent oxide film.

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