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Korrosion hos metaller och legeringar – Provning genom omväxlande doppning i saltlösning (ISO 11130:2017)

Corrosion of metals and alloys – Alternate immersion test in salt solution (ISO 11130:2017)

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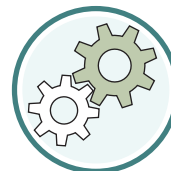
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Denna standard ersätter SS-EN ISO 11130:2010, utgåva 2.

The European Standard EN ISO 11130:2018 has the status of a Swedish Standard. This document contains the official version of EN ISO 11130:2018.

This standard supersedes the Swedish Standard SS-EN ISO 11130:2010, edition 2.

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Denna standard är framtagen av kommittén för Korrosion och korrosionsprovning av metaller i atmosfär, SIS/TK 146/AG 61.

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EUROPEAN STANDARD

EN ISO 11130

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2018

ICS 77.060

Supersedes EN ISO 11130:2010

English Version

Corrosion of metals and alloys - Alternate immersion test in salt solution (ISO 11130:2017)

Corrosion des métaux et alliages - Essai en immersions
alternées en solution saline (ISO 11130:2017)

Korrosion von Metallen und Legierungen -
Wechseltauchprüfung in Salzlösung (ISO 11130:2017)

This European Standard was approved by CEN on 21 November 2017.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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SS-EN ISO 11130:2018 (E)

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European foreword

This document (EN ISO 11130:2018) has been prepared by Technical Committee ISO/TC 156 “Corrosion of metals and alloys” in collaboration with Technical Committee CEN/TC 262 “Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2018, and conflicting national standards shall be withdrawn at the latest by September 2018.

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Endorsement notice

The text of ISO 11130:2017 has been approved by CEN as EN ISO 11130:2018 without any modification.

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Introduction

Corrosion of metals is influenced by factors which can vary significantly with environmental conditions. Therefore, corrosion resistance determined for metals during alternate immersion testing as described in this document can vary greatly with the test solution selected, the temperature during immersion and the temperature and humidity during the drying periods of the test.

Consequently, the result of an alternate immersion corrosion test is not taken as an indication of the corrosion resistance of the metal tested in all the different service environments where the metal can be used.

Nevertheless, results obtained by the method described in this document can indicate the relative corrosion resistance of different metals under in-service conditions, in particular when the service environment is similar to the test solution selected. The method can also be used to test metals under an applied tensile stress.

Corrosion of metals and alloys — Alternate immersion test in salt solution

1 Scope

This document specifies a method for assessing the corrosion resistance of metals by an alternate immersion test in salt solution, with or without applied stress.

The test is particularly suitable for quality control during the manufacture of metals including aluminium alloys and ferrous materials, and also for assessment purposes during alloy development.

Depending upon the chemical composition of the test solution, the test can be used to simulate the corrosive effects of marine splash zones, de-icing fluids and acid salt environments.

The term “metal” as used in this document includes metallic materials with or without corrosion protection.

This document is applicable to

- metals and their alloys,
- certain metallic coatings (anodic and cathodic with respect to the substrate),
- certain conversion coatings,
- certain anodic oxide coating, and
- organic coatings on metals.

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 8044, *Corrosion of metals and alloys — Basic terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Principle

The test consists of the immersion of a test specimen, stressed in accordance with ISO 7539-1 or unstressed, in a salt solution, followed by withdrawal and a period of drying.

The immersion and drying cycle is repeated at a given frequency for a given period. The extent of attack is then evaluated. For many materials, this provides a more severe corrosion test than simple continuous immersion.

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5 Test solution

5.1 General

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and distilled or deionized water or water of equivalent purity.

The test solution shall be prepared in accordance with the prescribed specification. Otherwise, the solution used should be the one most appropriate to the intended service conditions. Details of a neutral salt solution that is suitable for simulating the corrosive effect of a marine environment are given in [5.2](#).

Details of three other test solutions suitable for simulating salt-based de-icing liquid, acid salt conditions and ocean water are given in [Annex A](#).

5.2 Preparation

The neutral salt solution is prepared by dissolving a sufficient mass of sodium chloride in water to give a concentration of $35 \text{ g/l} \pm 1 \text{ g/l}$. The water used shall have a conductivity not higher than 2 mS/m (equal to $20 \text{ }\mu\text{S/cm}$) at $25 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$.

The sodium chloride shall contain a mass fraction of the heavy metals of copper (Cu), nickel (Ni) and lead (Pb) in total less than 0,005 %. It shall not contain a mass fraction of sodium iodide more than 0,1 % and a mass fraction of total impurities more than 0,5 %, calculated for dry salt. Sodium chloride with anti-caking agents should not be used, because such agents may act as corrosion inhibitors or accelerators.

NOTE A useful sodium chloride salt grade is a grade named Ph. Eur/USP or JIS, ACS.

Prior to use, check the pH of the salt solution using electrometric measurement. Measurements of pH shall be done using electrodes suitable for measuring pH in weakly buffered sodium chloride solutions in deionized water. Make any necessary corrections by adding hydrochloric acid, sodium hydroxide or sodium bicarbonate solution of analytical grade.

The volume of the test solution shall be defined by the specification. If no specification is available, it is recommended that the volume should be not less than 3 l per square decimetre of test specimen area.

6 Apparatus

6.1 General

The apparatus shall include the following components.

- A suitable system designed for the automatic, continuous performance of complete cycles of alternate immersion and withdrawal of the test specimens. This system shall provide uninterrupted operation throughout the duration of the test (see [8.1](#)). Each test specimen shall be connected to the system using suitable insulating material.
- One or more specimen cabinet for the test solution. Only one kind of metal, alloy or coating shall be immersed in each specimen cabinet. Replicate specimens can share the same specimen cabinet.

The system shall be designed such that the time taken for full immersion or withdrawal of each specimen is not more than 2 min.

NOTE Suitable apparatus for conducting alternate immersion tests in salt solution are illustrated schematically in [Annex B](#).

6.2 Materials of construction

6.2.1 Materials of construction that come into contact with the test solution shall be such that they are not affected by the corrodent to the extent that they can cause contamination of the solution and change its corrosivity.

6.2.2 Use of inert materials is recommended where feasible.

6.2.3 Metallic construction materials shall be selected from metals or alloys that are corrosion-resistant to the test environment or shall be protected with a suitable corrosion-resistant coating that also satisfies the conditions given in [6.2.1](#).

6.3 Test specimen holders

6.3.1 Test specimen holders shall be designed to insulate electrically the test specimens from each other and from any other bare metal. When this is not possible, as in the case of certain stressing bolts or jigs, the bare metal in contact with the specimen shall be isolated from the corrodent by suitable insulating materials. If a protective coating is used, it shall be of a type that will not leach inhibiting or accelerating ions or protective oils over the non-coated portions of the specimen. In particular, coatings containing chromates shall be avoided.

6.3.2 The shape and form of test specimen supports and holders shall be such that

- they avoid, as much as possible, any interference of free contact of the test specimen with the salt solution,
- they do not obstruct air flow over the test specimen, thereby retarding the drying rate, and
- they do not retain a pool of solution in contact with the test specimen after withdrawal from the solution.

6.4 Air circulation

6.4.1 Air circulation is recognized as an important factor because it affects both the rate at which test specimens dry and the loss of water by evaporation. Optimum conditions for air circulation have not been established.

6.4.2 It is important to provide uniform drying conditions for test specimens. A circulation of air capable of drying specimens within about 40 min is recommended.

Drying by forced air blasts on the test specimens is not recommended because of the difficulty in maintaining uniform drying of large groups of test specimens. Moreover, stagnant air conditions shall be avoided.

7 Test specimens

The test shall be performed with manufactured products or parts or with any other suitable test specimens.

The shape and dimensions of test specimen should be agreed between the interested parties. If no agreement is made, rectangular test specimen of 90 mm × 120 mm × 1 mm is recommended.

A minimum of three test specimens should be used.

If the size of the test specimens is incompatible with the specimen cabinet, the specimens shall be sectioned. The cut edge should be protected by a suitable coating applied to a distance of 5 mm around