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**Corrosion of metals and alloys —  
Guidelines for the evaluation of pitting  
corrosion**

*Corrosion des métaux et alliages — Lignes directrices pour  
l'évaluation de la corrosion par piqûres*



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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 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 11463:1995), which has been technically revised. The main changes compared with the previous edition are as follows:

- modern surface analysis and characterization techniques for ex situ examination have been included.

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](http://www.iso.org/members.html).

## Introduction

It is important to be able to determine the extent of pitting and its characteristics, either in a service application, where it is necessary to estimate the remaining life in a metal structure, or in laboratory test programmes that are used to select pitting-resistant materials for a particular service. Corrosion pits can also act as the precursor to other damage modes such as stress corrosion cracking and corrosion fatigue.

The application of the materials to be tested will determine the minimum pit size to be evaluated and whether total area covered, average pit depth, maximum pit depth or another criterion is the most important to measure.



# Corrosion of metals and alloys — Guidelines for the evaluation of pitting corrosion

## 1 Scope

This document gives guidelines for the selection of procedures that can be used in the identification and examination of corrosion pits and in the evaluation of pitting corrosion and pit growth rate.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

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

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

## 4 Identification and examination of pits

### 4.1 Preliminary low magnification visual inspection

**4.1.1** A visual examination of the corroded metal surface with or without the use of a low-power magnifying glass may be used to determine the extent of corrosion and the apparent location of pits. It is often advisable to photograph the corroded surface so that it can be compared with the clean surface after the removal of corrosion products or with a fresh unused piece of material.

**4.1.2** If the metal specimen has been exposed to an unknown environment, the composition of the corrosion products may be of value in determining the cause of corrosion. Recommended procedures for the removal of particulate corrosion products should be followed and the material removed should be preserved for future identification.

**4.1.3** To expose the pits fully, it is recommended that cleaning procedures should be used to remove the corrosion products. Rinsing with water followed by light mechanical cleaning can be sufficient for lightly adhered corrosion products. Chemical cleaning is required for more adherent products. ISO 8407<sup>[1]</sup> provides a range of chemical cleaning processes. Preliminary testing should be undertaken to ensure that attack of the base metal is avoided.

### 4.2 Optical microscopic examination of pit size and shape

**4.2.1** Examine the cleaned metal surface to determine the approximate size and distribution of pits. Follow this procedure by a more detailed examination through a microscope using a low magnification (approximately  $\times 20$ ). Pits can have various sizes and shapes. A visual examination of the metal surface can show a round, elongated or irregular opening, but it seldom provides an accurate indication of the