INTERNATIONAL STANDARD

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# Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens

*Corrosion des métaux et alliages — Élimination des produits de corrosion sur les éprouvettes d'essai de corrosion*



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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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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 third edition cancels and replaces the second edition (ISO 8407:2009), which has been technically revised. The main changes compared with the previous edition are as follows:

— Table A.1 has been revised to include current chemical cleaning procedures for the removal of corrosion products.

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.

# Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens

**WARNING — Safety rules for personnel: handling of the solutions used for the removal of corrosion products shall be left to skilled personnel or conducted under their control. The equipment shall be used and maintained by skilled personnel, not only so that the procedures can be performed correctly, but also because of the hazards to health and safety that are involved.**

## 1 Scope

This document specifies procedures for the removal of corrosion products formed on metal and alloy corrosion test specimens during their exposure in corrosive environments. For the purpose of this document, the term "metals" refers to pure metals and alloys.

The specified procedures are designed to remove all corrosion products without significant removal of base metal. This allows an accurate determination of the mass loss of the metal, which occurred during exposure to the corrosive environment.

In some cases, these procedures are also applicable to metal coatings, providing the possible effects from the substrate are considered.



## 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 Procedures

### 4.1 General

**4.1.1** A light mechanical cleaning treatment by brushing, e.g. a soft bristle brush under running water, should first be applied to remove lightly adherent or bulky corrosion products.

**4.1.2** If the treatment described in 4.1.1 does not remove all corrosion products, it will be necessary to use other procedures. These are of three types:

a) chemical;

b) electrolytic;

c) more vigorous mechanical treatments.

NOTE These treatments will also remove some base metal.

Whichever method is used, it might be necessary to repeat the cleaning treatment to ensure complete removal of the corrosion products. Removal shall be confirmed by visual examination. The use of a low-power microscope (i.e. × 7 to × 30) is particularly helpful with a pitted surface since corrosion products can accumulate in pits.

**4.1.3** An ideal procedure should remove corrosion products and not result in the removal of any base metal. Two procedures can be used to confirm this point. One procedure uses a control specimen (see 4.1.4) and the other requires a certain number of cleaning cycles on the corroded specimen (see 4.1.5). The procedures shall be maintained while the rust removal performance of the solutions listed in Tables A.1 and A.2 is not impaired.

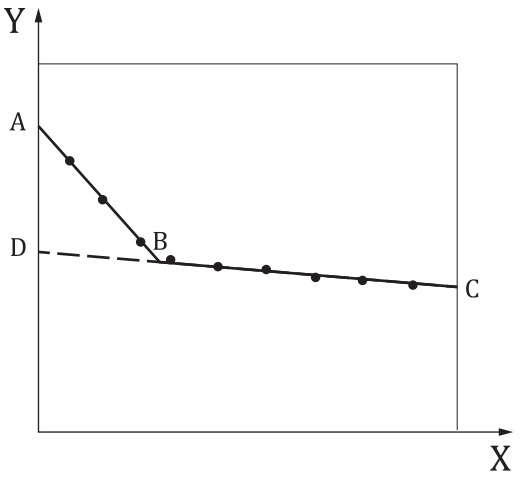
NOTE 1 Indications that the solution needs to be discarded can be discoloration or the presence of a significant amount of corrosion products in the solution.

NOTE 2 Some solutions might need some aging before working without etching the substrate.

**4.1.4** Uncorroded control specimens, which should be similar chemically, metallurgically and geometrically to the test specimens, should be cleaned by the same procedure as used for the test specimen. By weighing the control specimen before and after cleaning (weighing to the fifth significant figure is suggested, e.g. a 70 g specimen should be weighed to three decimal places), the metal loss resulting from cleaning may be determined. The mass loss of the control specimen will reflect the mass loss of test specimens resulting from the cleaning procedure.

**4.1.5** The cleaning of each corroded test specimen should be repeated several times after the removal of the corrosion products is completed. The mass shall be plotted as a function of the periods of cleaning cycles with the same interval time or time units (see Figure 1). Point A represents the mass of corroded specimens before the start of the cleaning. In many cases, two straight lines, AB and BC, will be obtained. Line AB characterizes the removal of corrosion products and may not always be visible. Line BC characterizes the removal of the substrate after the corrosion products are completely removed. Point D, which characterizes the mass of the pure metal at zero number of cleaning cycles, is obtained by extrapolation of line BC to the ordinate axis. In some cases, the relationship may not be linear, and the most appropriate extrapolation shall then be made. If the relationship of B and C is not linear, a linear regression method, e.g. by applying the least squares from later points of cleaning cycles, can be used for estimation of the point for the D value.

If the durations of each cleaning step are not equal, the x-axis should be expressed in units of cumulative exposure time in the cleaning solution, rather than the number of cleaning steps used up to that point.




**Key**

X numbers of cleaning cycles or time units

Y mass

**Figure 1 — Mass of corroded specimens after repetitive cleaning cycles**