International Standard

ISO 18971

First edition
2026-01

Corrosion of metals and alloys — Monitoring method for corrosion states of stainless steel in industrial cooling water

Corrosion des métaux et alliages — Méthode de surveillance de l'état de corrosion de l'acier inoxydable dans les eaux de refroidissement industrielles

Reference number
ISO 18971:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Monitoring principle ... **2**
5 Monitoring system ... **4**
5.1 General ... 4
5.2 Monitoring probes (sensors) ... 5
5.3 Detecting instruments ... 6
5.4 Selection and setting of on-site corrosion monitoring points ... 6
5.5 Calibration of corrosion monitoring system ... 7
5.5.1 Calibration cycle ... 7
5.5.2 Calibration of detecting instruments ... 7
6 Methods and procedures of corrosion monitoring ... **7**
6.1 Methods of polarization resistance measurement ... 7
6.1.1 Sine wave excitation ... 7
6.1.2 Triangular wave excitation ... 7
6.2 Corrosion potential measurement ... 7
6.3 Monitoring and evaluation of corrosion states of stainless steel ... 7
6.3.1 Monitoring procedures ... 7
6.3.2 Corrosion states evaluation of stainless steel ... 8
7 Data acquisition and processing ... **8**
7.1 Data sampling cycle ... 8
7.2 Data records ... 8
7.2.1 Records of the electrochemical data ... 8
7.2.2 Records of the environmental data ... 9
7.3 Data analysis and processing ... 9
8 Management and operation attentions of the monitoring system ... **9**
8.1 Management of monitoring system ... 9
8.2 Operation attentions ... 9
9 Monitoring report ... **10**
9.1 General ... 10
9.2 Basic information of monitoring ... 10
9.3 Information of the monitoring system ... 10
9.4 Monitoring results and analysis ... 10
Annex A (informative) **Corrosiveness monitoring and evaluation of industrial cooling water** ... **11**
Annex B (informative) **Case study: Monitoring the corrosion of stainless steel** ... **12**
Bibliography ... **14**

© ISO 2026 – All rights reserved

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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.

This document was prepared by ISO/TC 156, *Corrosion of metals and alloys*.

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.

© ISO 2026 – All rights reserved

Introduction

Cooling water is widely used in industrial production. In the industrial cooling water system, the use of stainless steel tubes in heat exchangers is very common. It generally accounts for over 60 %, but some countries have accounted for over 90 %. The corrosion of stainless steel in industrial cooling water is mainly localized corrosion dominated by pitting, which is invisible, fast-acting and difficult to prevent. When localized corrosion causes perforation in stainless steel, this can have disastrous consequences.

The polarization resistance method is widely used to monitor the uniform corrosion rate of metals. This document describes the method of using polarization resistance and corrosion potential to monitor the corrosion states of stainless steel in industrial cooling water. It can be used to monitor the corrosion tendency of stainless steel. It can also be used to indicate the change of corrosiveness of cooling water (see Annex A). Protective measures can be taken in timely manner to prevent the occurrence of accidents caused by corrosion perforation of stainless steel tubes.

© ISO 2026 – All rights reserved

Corrosion of metals and alloys — Monitoring method for corrosion states of stainless steel in industrial cooling water

1 Scope

This document specifies the method and criteria for monitoring corrosion states of heat exchange tubes, heat exchange plates and other components made of stainless steel in industrial cooling water by combination of polarization resistance and corrosion potential.

This document is applicable to the monitoring of the corrosion states of stainless steel in industrial cooling water or similar media, as well as the monitoring of the corrosiveness of industrial cooling water. The cooling water is generally taken from natural water, tap water and reclaimed water. It is applicable to industrial cooling water with pH value of 5,0 to 11,0, temperature of 0 °C to 60 °C, and conductivity higher than 20 µS/cm.

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 — Vocabulary*

ISO 15510, *Stainless steels — Chemical composition*

ASTM G59-97:2020, *Standard test method for conducting potentiodynamic polarization resistance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044, ISO 15510 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
cooling water
water which is used to absorb and remove heat

[SOURCE: ISO 6107:2021, 3.140]

3.2
natural water
water that exists in nature, including surface water (e.g. water from rivers, lakes and seas) and groundwater

3.3
reclaimed water
wastewater that has been treated to meet specific water quality for intended beneficial use

[SOURCE: ISO 20670:2023, 3.81]

© ISO 2026 – All rights reserved