
**Corrosion of metals and alloys —
Determination of the critical crevice
temperature (CCT) for stainless steels
under potentiostatic control**

Corrosion des métaux et alliages — Détermination de la température critique de corrosion caverneuse (TCCC) des aciers inoxydables sous contrôle potentiostatique





COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Equipment	2
6 Procedure	3
6.1 Preparation of reference electrodes	3
6.2 Preparation of specimen	3
6.3 Preparation of solution	4
6.4 Setting up the test	4
6.5 Ending test	5
7 Assessment of results	5
8 Test report	5
Annex A (informative) Examples of how the connections of the electrode can be made	7
Annex B (normative) Schematic representation of different crevice formers used for CCT-measurements	8
Annex C (normative) Calibration of specimen temperature vs. solution temperature if a specimen holder is used	11
Annex D (informative) Potential difference of selected reference electrodes at 25 °C with respect to the standard hydrogen electrode (SHE)	12
Bibliography	13

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).

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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 156, *Corrosion of metals and alloys*.

Introduction

Stainless steel is susceptible to pitting corrosion, crevice corrosion, and stress-corrosion cracking, etc., although it is used as generally corrosion-resistant material. The basic methodology for testing localized corrosion was first standardized in ASTM G 150. This method describes the susceptible to pitting corrosion and it is also standardized in ISO 17864. In this International Standard, the susceptible to crevice corrosion is examined. This is performed by recording the electrochemical critical crevice corrosion temperature for a material using a specific crevice former. Crevice corrosion phenomenon is generally of a random nature and therefore these measurements require at least a couple of values.

Corrosion of metals and alloys — Determination of the critical crevice temperature (CCT) for stainless steels under potentiostatic control

1 Scope

This International Standard describes the procedure for determining the critical crevice temperature (CCT) for stainless steels under potentiostatic control.

The principal advantage of the test is the rapidity with which the CCT can be measured in a single test procedure. The CCT, as determined in this International Standard, can be used as a relative index of performance, for example, to compare the relative performance of different grades of stainless steel.

The test described in this International Standard is not intended to determine the temperature at which crevice corrosion will occur in service.

This method is not intended for materials with critical pitting temperature (CPT) values below 20 °C measured in accordance with ISO 17864, when measured in the same test solution and at the same potential

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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

ISO 17864, *Corrosion of metals and alloys — Determination of the critical pitting temperature under potentiostatic control*

ISO 18070, *Corrosion of metals and alloys — Crevice corrosion formers with disc springs for flat specimens or tubes of stainless steels in corrosive solutions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044, ISO 17864 and the following apply.

3.1

critical crevice temperature

CCT

lowest temperature on the surface of the specimen at which stable propagating crevice corrosion occurs under specified test conditions

Note 1 to entry: The critical crevice corrosion temperature is defined as the temperature of the specimen at which the current density exceeds a specified value. A recommended value is 10 $\mu\text{A cm}^{-2}$, referring to area exposes in the measurement to make sure that it is above the passive current, for 60 s. A 60 s delay is used in order to ensure that the observed current increase originates from stable propagating crevice corrosion, and not a short-lived current peak.^[4]