
**Determination of resistance to
intergranular corrosion of stainless
steels —**

**Part 3:
Corrosion test for low-Cr ferritic
stainless steels**

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*Détermination de la résistance à la corrosion intergranulaire des
aciers inoxydables —*

*Partie 3: Essai de corrosion pour les aciers inoxydables ferritiques à
faible teneur en chrome*
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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Preparation of test specimens	1
4.1 Principle	1
4.2 Dimensions	2
4.3 Welded test pieces	4
4.4 Sensitization heat treatment	4
4.5 Mechanical preparation	4
4.6 Degreasing and drying	4
5 Test methods	4
6 Evaluation by metallographic examination	6
7 Test report	6
Bibliography	7

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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).

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 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 the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

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

A list of all parts in the ISO 3651 series can be found on the ISO website. www.iso.org/iso/3651-3-2017

Introduction

The term “intergranular corrosion test” denotes the corrosion test carried out by means of preferential attack of the grain boundaries.

The low-Cr [less than 16 % Cr, less than 0,3 % Ni, less than 0,3 % Ti and less than 0,3 % Nb, less than 0,3 % (Ti + Atomic weight ratio Nb)] ferritic stainless steels may be subject to such attack when they have been exposed to a temperature between about 500 °C to 1 300 °C. This heat cycle, which may provoke sensitization to intergranular corrosion, may occur during rolling or welding operation.

Low-Cr ferritic stainless steels may show high risks to uniform corrosion rates and copper deposit when tested by the methods given by ISO 3651-1 and ISO 3651-2 since the electrochemical potential difference between the matrix and the Cr depletion for low-Cr ferritic stainless steels is much less than that of medium-Cr ferritic stainless steels. These risks should be considered in selecting this test method. Application of this standard test to the other stainless steels out of the above specifications should be made based on the specific agreement between the interested parties.

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Determination of resistance to intergranular corrosion of stainless steels —

Part 3: Corrosion test for low-Cr ferritic stainless steels

1 Scope

This document specifies the determination of the intergranular corrosion susceptibility of low-Cr [less than 16 % Cr, less than 0,3 % Ni, less than 0,3 % Ti and less than 0,3 % Nb, less than 0,3 % (Ti + Atomic weight ratio Nb)] ferritic stainless steels in the 0,5 % sulfuric acid/copper sulfate test. It also specifies the purposes which may be assigned to the test.

The method is applicable to stainless steels supplied in the form of rolled sheets and welded tubes and intended for use in a mildly oxidizing acid medium.

It is important to note that the result of the corrosion test is only strictly valid for the corrosive medium used in the test. It constitutes a basis for estimating the resistance to intergranular corrosion but cannot be used to check resistance to other forms of corrosion (general corrosion, pitting, stress corrosion, etc.). It is important for the user to adapt the specified corrosion test where steels are used. This test is, in no case, considered as an absolute criterion of the quality of the metal.

2 Normative references

ISO 3651-3:2017

<https://standards.iteh.ai/catalog/standards/sist/8ed6ec48-6e8a-4a74-8b58-59a51e1e3126/iso-3651-3-2017>

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>

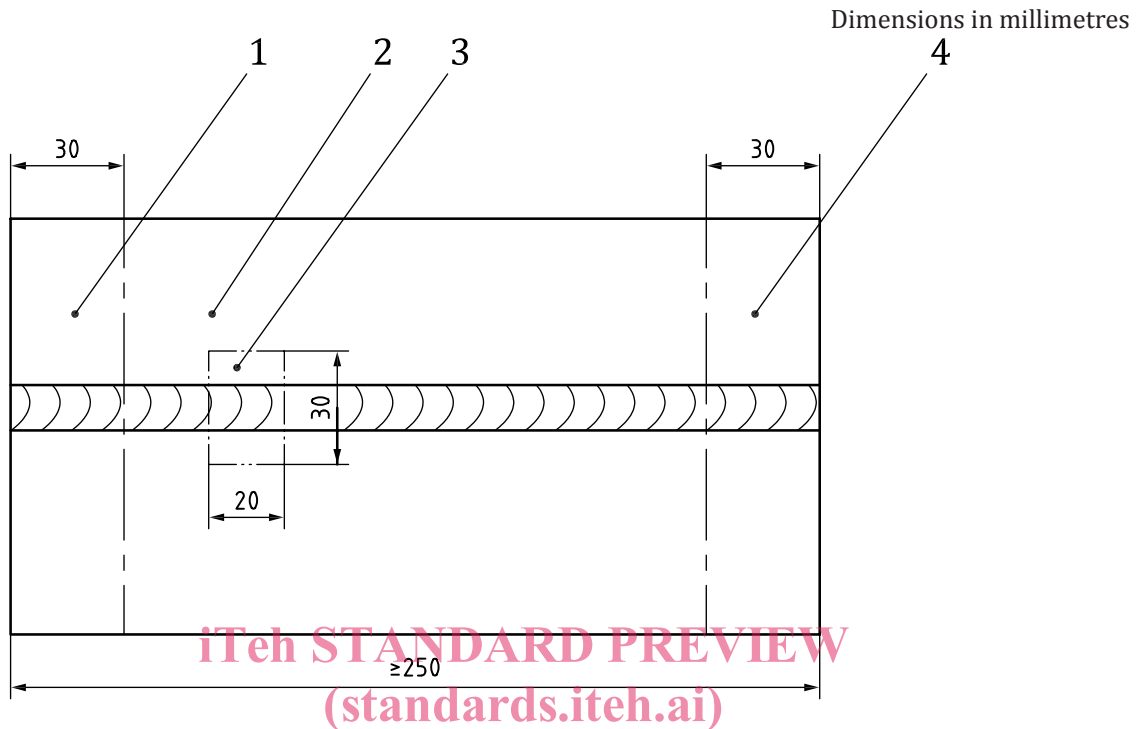
4 Preparation of test specimens

4.1 Principle

Depending on the purpose of the test and agreement between supplier and purchaser, the test pieces shall be prepared as specified in 4.2, 4.3 or 4.4. The thickness of the test specimen can be the same as the original samples.

4.2 Dimensions

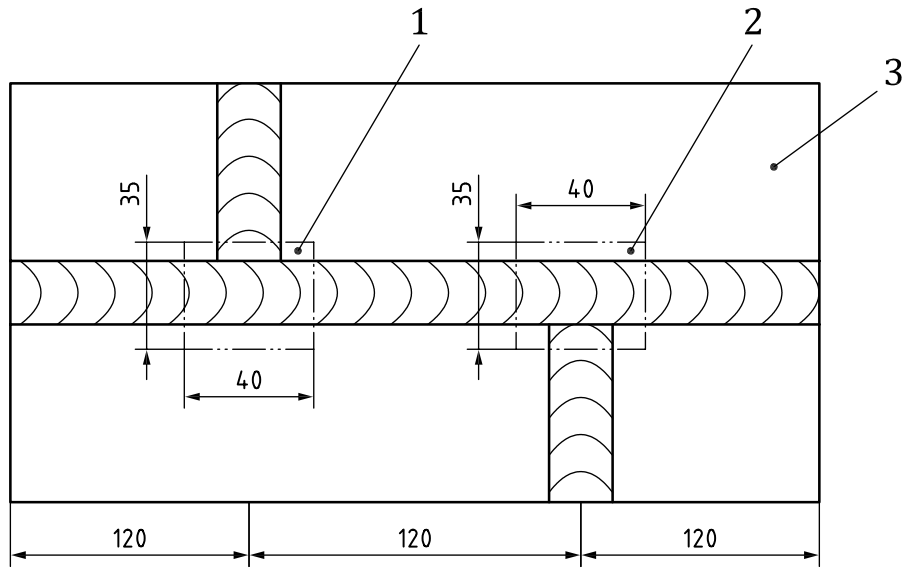
A specimen having a total surface area of 5 cm² to 20 cm² is recommended. It should include welded zone, heat-affected zone and unaffected base metal.



Key

- 1 no sampling area (avoid weld defects) [ISO 3651-3:2017](https://standards.iteh.ai/catalog/standards/sist/8ed6ec48-6e8a-4a74-8b58-bb9a57ae46e5/iso-3651-3-2017)
- 2 sampling area <https://standards.iteh.ai/catalog/standards/sist/8ed6ec48-6e8a-4a74-8b58-bb9a57ae46e5/iso-3651-3-2017>
- 3 welding sample
- 4 no sampling area

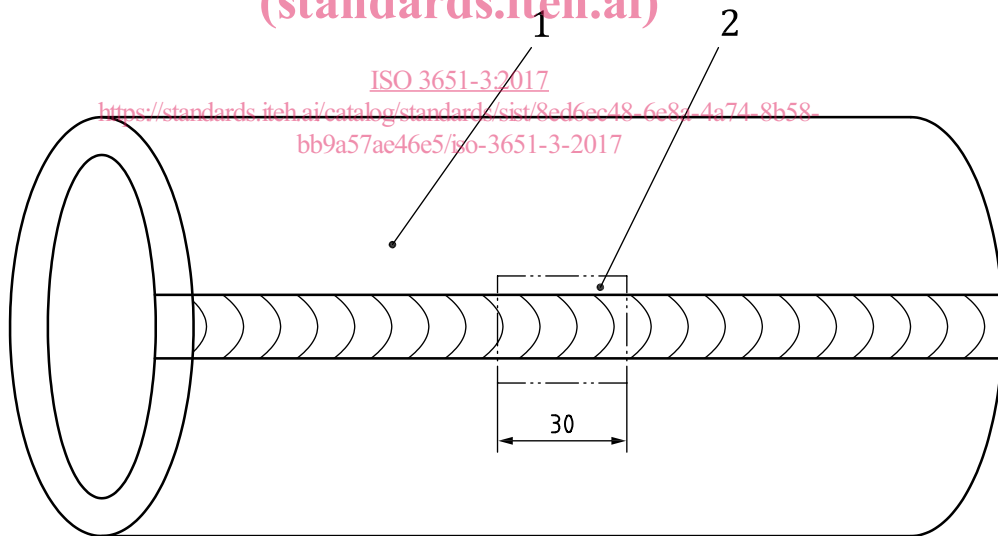
Figure 1 — Test piece for plates and strips with welded butt joint



Key

- 1 welding sample
- 2 welding sample
- 3 sampling area

Figure 2 — Test piece for plates and strips with crossing welded butt joint
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Key

- 1 sampling area
- 2 welding samples

Figure 3 — Longitudinal test piece for tubes with welded butt joint