

This is a preview of "ISO 15653:2018". [Click here to purchase the full version from the ANSI store.](#)

Second edition
2018-01

Metallic materials — Method of test for the determination of quasistatic fracture toughness of welds

*Matériaux métalliques — Méthode d'essai pour la détermination de la
ténacité quasi statique à la rupture des soudures*



Reference number
ISO 15653:2018(E)

© ISO 2018



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

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, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Published in Switzerland

This is a preview of "ISO 15653:2018". [Click here to purchase the full version from the ANSI store.](#)

Contents

	Page
Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and units	3
5 Principle	3
6 Choice of specimen design, specimen orientation and notch location	4
6.1 Classification of target area for notching.....	4
6.2 Specimen design.....	4
6.3 Specimen and crack plane orientation.....	4
7 Pre-machining metallography	8
7.1 Microstructural assessment of macrosections.....	8
7.2 Additional requirements for heat-affected zone tests.....	9
8 Machining	9
8.1 Tolerances on specimen dimensions.....	9
8.2 Notch placement for through-thickness notched specimens.....	10
8.3 Notch placement for surface-notched specimens.....	10
8.4 Notch machining.....	11
9 Specimen preparation	16
9.1 Fatigue precracking.....	16
9.2 Side grooving.....	16
10 Test apparatus, requirements and test procedure	16
11 Post-test metallography	16
11.1 General.....	16
11.2 Through-thickness notched specimens.....	17
11.2.1 Sectioning.....	17
11.2.2 Assessment.....	17
11.3 Surface-notched specimens.....	17
11.3.1 Sectioning.....	17
11.3.2 Assessment.....	17
11.4 Assessment of pop-in.....	17
12 Post-test analysis	20
12.1 Choice of tensile properties.....	20
12.2 Determination of fracture toughness.....	21
12.2.1 K_{Ic}	21
12.2.2 δ	21
12.2.3 J	22
12.2.4 Shallow-notched bend specimen.....	22
12.3 Qualification requirements.....	23
12.3.1 General.....	23
12.3.2 Weld-width-to-crack-ligament ratio.....	23
12.3.3 Crack front straightness.....	23
12.3.4 Symbols used to identify fracture toughness values.....	25
12.3.5 Through-thickness notched specimens.....	25
12.3.6 Surface-notched specimens.....	25
13 Test report	26
Annex A (informative) Examples of notch locations	27
Annex B (informative) Examples of pre-test and post-test metallography	29

This is a preview of "ISO 15653:2018". [Click here to purchase the full version from the ANSI store.](#)

Annex C (informative) Residual-stress modification and precracking technique	31
Annex D (normative) Assessment of pop-in	35
Annex E (informative) Shallow-notched bend specimen testing	42
Bibliography	45

This is a preview of "ISO 15653:2018". [Click here to purchase the full version from the ANSI store.](#)

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.

This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 4, *Toughness testing — Fracture (F), Pendulum (P), Tear (T)*.

This second edition of ISO 15653 cancels and replaces the first edition (ISO 15653:2010), which has been technically revised.

The main changes compared to the previous edition are as follows:

- new formulae for the calculation of single-point determination of CTOD ([12.2.2](#)) have been added;
- introduction for reverse bending in [C.3](#) has been added;
- assessment of pop-in in [D.1](#) has been clarified;
- new formula for the calculation for single-point determination of CTOD in shallow notched specimens in [E.4](#) has been added.