

This is a preview of "ISO 6892-1:2019". [Click here to purchase the full version from the ANSI store.](#)

Third edition
2019-11

Metallic materials — Tensile testing — Part 1: Method of test at room temperature

Matériaux métalliques — Essai de traction —

Partie 1: Méthode d'essai à température ambiante



Reference number
ISO 6892-1:2019(E)

© ISO 2019



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO 6892-1:2019". [Click here to purchase the full version from the ANSI store.](#)

Contents

| | Page |
|--|-----------|
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 1 |
| 4 Symbols | 6 |
| 5 Principle | 8 |
| 6 Test pieces | 8 |
| 6.1 Shape and dimensions..... | 8 |
| 6.1.1 General..... | 8 |
| 6.1.2 Machined test pieces..... | 9 |
| 6.1.3 Unmachined test pieces..... | 9 |
| 6.2 Types..... | 9 |
| 6.3 Preparation of test pieces..... | 10 |
| 7 Determination of original cross-sectional area | 10 |
| 8 Original gauge length and extensometer gauge length | 10 |
| 8.1 Choice of the original gauge length..... | 10 |
| 8.2 Marking the original gauge length..... | 10 |
| 8.3 Choice of the extensometer gauge length..... | 11 |
| 9 Accuracy of testing apparatus | 11 |
| 10 Conditions of testing | 11 |
| 10.1 Setting the force zero point..... | 11 |
| 10.2 Method of gripping..... | 11 |
| 10.3 Testing rates..... | 12 |
| 10.3.1 General information regarding testing rates..... | 12 |
| 10.3.2 Testing rate based on strain rate (method A)..... | 12 |
| 10.3.3 Testing rate based on stress rate (method B)..... | 14 |
| 10.3.4 Report of the chosen testing conditions..... | 15 |
| 11 Determination of the upper yield strength | 16 |
| 12 Determination of the lower yield strength | 16 |
| 13 Determination of proof strength, plastic extension | 16 |
| 14 Determination of proof strength, total extension | 17 |
| 15 Method of verification of permanent set strength | 17 |
| 16 Determination of the percentage yield point extension | 17 |
| 17 Determination of the percentage plastic extension at maximum force | 17 |
| 18 Determination of the percentage total extension at maximum force | 18 |
| 19 Determination of the percentage total extension at fracture | 18 |
| 20 Determination of percentage elongation after fracture | 18 |
| 21 Determination of percentage reduction of area | 19 |
| 22 Test report | 20 |
| 23 Measurement uncertainty | 20 |
| 23.1 General..... | 20 |
| 23.2 Test conditions..... | 21 |
| 23.3 Test results..... | 21 |

This is a preview of "ISO 6892-1:2019". [Click here to purchase the full version from the ANSI store.](#)

| | |
|--|-----------|
| Annex A (informative) Recommendations concerning the use of computer-controlled tensile testing machines | 34 |
| Annex B (normative) Types of test pieces to be used for thin products: sheets, strips, and flats between 0,1 mm and 3 mm thick | 40 |
| Annex C (normative) Types of test pieces to be used for wire, bars, and sections with a diameter or thickness of less than 4 mm | 43 |
| Annex D (normative) Types of test pieces to be used for sheets and flats of thickness equal to or greater than 3 mm and wire, bars, and sections of diameter or thickness equal to or greater than 4 mm | 44 |
| Annex E (normative) Types of test pieces to be used for tubes | 48 |
| Annex F (informative) Estimation of the crosshead separation rate in consideration of the stiffness (or compliance) of the testing equipment | 50 |
| Annex G (normative) Determination of the modulus of elasticity of metallic materials using a uniaxial tensile test | 52 |
| Annex H (informative) Measuring the percentage elongation after fracture if the specified value is less than 5 % | 61 |
| Annex I (informative) Measurement of percentage elongation after fracture based on subdivision of the original gauge length | 62 |
| Annex J (informative) Determination of the percentage plastic elongation without necking, A_{wn}, for long products such as bars, wire, and rods | 64 |
| Annex K (informative) Estimation of the uncertainty of measurement | 65 |
| Annex L (informative) Precision of tensile testing — Results from interlaboratory programmes .. | 69 |
| Bibliography | 76 |

This is a preview of "ISO 6892-1:2019". 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 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 Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, *Uniaxial testing*.

This third edition cancels and replaces the second edition (ISO 6892-1:2016), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

- correction of the title of a standard in [Clause 2](#);
- correction of the designation "coefficient of determination" ("coefficient of determination" instead of "coefficient of correlation");
- correction of [Formula \(1\)](#);
- wording in [10.3.2.1](#);
- wording in the key of [Figure 9](#);
- wording in [Table B.2](#);
- wording in [Table D.3](#);
- correction of the references.

A list of all parts in the ISO 6892 series can be found on the ISO website.

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.

Introduction

During discussions concerning the speed of testing in the preparation of ISO 6892, it was decided to recommend the use of strain rate control in future revisions.

In this document, there are two methods of testing speeds available. The first, method A, is based on strain rates (including crosshead separation rate) and the second, method B, is based on stress rates. Method A is intended to minimize the variation of the test rates during the moment when strain rate sensitive parameters are determined and to minimize the measurement uncertainty of the test results. Therefore, and out of the fact that often the strain rate sensitivity of the materials is not known, the use of method A is strongly recommended.

NOTE In what follows, the designations "force" and "stress" or "extension", "percentage extension", and "strain", respectively, are used on various occasions (as figure axis labels or in explanations for the determination of different properties). However, for a general description or point on a curve, the designations "force" and "stress" or "extension", "percentage extension", and "strain", respectively, can be interchanged.