SLOVENSKI STANDARD
SIST EN ISO 10113:2020

01-junij-2020

Nadomešča:
SIST EN ISO 10113:2014

Kovinski materiali - Pločevina in trakovi - Ugotavljanje količnika plastične anizotropije (ISO 10113:2020, popravljena različica 2020-11)

Metallic materials - Sheet and strip - Determination of plastic strain ratio (ISO 10113:2020, Corrected version 2020-11)

Metallische Werkstoffe - Blech und Band - Bestimmung der senkrechten Anisotropie (ISO 10113:2020, korrigierte Fassung 2020-11)

Matériaux métalliques - Tôles et bandes - Détermination du coefficient d'anisotropie plastique (ISO 10113:2020, Version corrigée 2020-11)

SIST Preview
(https://ecommerce.sist.si)
SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-9316-4513-60d6-6971c6d0c4b6/sist-en-iso-10113-2020

Ta slovenski standard je istoveten z: **EN ISO 10113:2020**

ICS:

77.040.10 Mehansko preskušanje kovin Mechanical testing of metals

SIST EN ISO 10113:2020 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST EN ISO 10113:2020

SIST Preview
(https://ecommerce.sist.si)
SIST Preview
(https://ecommerce.sist.si)
SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020
SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

SIST EN ISO 10113:2020

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 10113

February 2020

ICS 77.040.10

Supersedes EN ISO 10113:2014

English Version

Metallic materials - Sheet and strip - Determination of plastic strain ratio (ISO 10113:2020, Corrected version 2020-11)

Matériaux métalliques - Tôles et bandes - Détermination du coefficient d'anisotropie plastique (ISO 10113:2020, Version corrigée 2020-11)

Metallische Werkstoffe - Blech und Band - Bestimmung der senkrechten Anisotropie (ISO 10113:2020, korrigierte Fassung 2020-11)

This European Standard was approved by CEN on 5 January 2020.

This European Standard was corrected and reissued by the CEN-CENELEC Management Centre on 09 December 2020.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

SIST Preview

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2020 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO 10113:2020 E

SIST EN ISO 10113:2020

Contents

Page

European foreword **3**

SIST Preview
(https://ecommerce.sist.si)

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

SIST EN ISO 10113:2020

European foreword

This document (EN ISO 10113:2020) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee CEN/TC 459/SC 1 “Test methods for steel (other than chemical analysis)” the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 10113:2014.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

SIST Preview
(https://ecommerce.sist.si)

Endorsement notice

The text of ISO 10113:2020, Corrected version 2020-11 has been approved by CEN as EN ISO 10113:2020 without any modification.

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

SIST EN ISO 10113:2020

SIST Preview
(https://ecommerce.sist.si)

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

SIST EN ISO 10113:2020

INTERNATIONAL STANDARD

ISO 10113

Third edition
2020-01

Corrected version
2020-11

Metallic materials — Sheet and strip — Determination of plastic strain ratio

Matériaux métalliques — Tôles et bandes — Détermination du coefficient d'anisotropie plastique

SIST Preview
(https://ecommerce.sist.si)

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

Reference number
ISO 10113:2020(E)

© ISO 2020

SIST EN ISO 10113:2020

SIST Preview
(https://ecommerce.sist.si)

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

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

 © ISO 2020 – All rights reserved

SIST EN ISO 10113:2020

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Symbols ... **2**

5 Principle ... **4**

6 Test equipment ... **5**

7 Test piece ... **6**

8 Procedure ... **6**
8.1 General ... 6
8.2 Method without using any extensometer (manual method) ... 7
8.2.1 General ... 7
8.2.2 Testing ... 7
8.2.3 Evaluation ... 8
8.3 Method only with length extensometer (semi-automatic method) ... 8
8.3.1 General ... 8
8.3.2 Testing ... 8
8.3.3 Evaluation ... 9
8.4 Method with width and length extensometer (automatic method) ... 9
8.4.1 General ... 9
8.4.2 Testing ... 9
8.4.3 Evaluation ... 9

9 Additional test results ... **12**

10 Test report ... **12**

Annex A (informative) **Methods for investigating sources of errors in *r*-value determination** ... **13**

Annex B (informative) **International comparison of symbols used in the determination of plastic strain ratio** ... **23**

Bibliography ... **24**

SIST Preview
(https://ecommerce.sist.si)
SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4a81aa0-93f6-45f3-b0d6-6971e6d0e4b6/sist-en-iso-10113-2020

© ISO 2020 – All rights reserved

SIST EN ISO 10113:2020

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.

SIST Preview
(https://ecommerce.sist.si)

This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 1, *Test methods for steel (other than chemical analysis)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

This third edition cancels and replaces the second edition (ISO 10113:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

— a new structure;

— the addition of the semi-automatic method (see 8.3);

— a clear differentiation between the manual, the semi-automatic and the automatic methods (see 8.2, 8.3 and 8.4);

— the addition of the methods of investigating sources of errors in *r*-value determination (see Annex A).

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.

This corrected version of ISO 10113:2020 incorporates the following corrections:

— Correction of the description of the test in the fourth paragraph of 8.4.2.

 © ISO 2020 – All rights reserved

SIST EN ISO 10113:2020

Metallic materials — Sheet and strip — Determination of plastic strain ratio

1 Scope

This document specifies a method for determining the plastic strain ratio of flat products (sheet and strip) made of metallic materials.

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 6892-1:2019, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

SIST Preview
(https://ecommerce.sist.si)

For the purposes of this document, the terms and definitions given in ISO 6892-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

SIST EN ISO 10113:2020
https://ecommerce.sist.si/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

— IEC Electropedia: available at http://www.electropedia.org/

3.1
plastic strain ratio
r
ratio of the true plastic width strain to the true plastic thickness strain in a test piece that has been subjected to uniaxial tensile stress calculated using Formula (1)

$$r = \frac{\varepsilon_{p_b}}{\varepsilon_{p_a}} \tag{1}$$

where

ε_{p_a} is the true plastic thickness strain;

ε_{p_b} is the true plastic width strain.

Note 1 to entry: The above expression using a single point is only valid in the region where the plastic strain is homogeneous.

Note 2 to entry: Since it is easier and more precise to measure changes in length than in thickness, the following relationship derived from the law of constancy of volume is used up to the percentage plastic extension at maximum force, A_g, to calculate the plastic strain ratio, r [see Formula (2)].

© ISO 2020 – All rights reserved

SIST EN ISO 10113:2020

$$r = \frac{\ln\left(\frac{b_1}{b_o}\right)}{\ln\left(\frac{L_o b_o}{L_1 b_1}\right)} \quad (2)$$

Note 3 to entry: For some materials exhibiting a phase change during plastic deformation, the volume of the measured section cannot always be assumed to be constant. In such cases, the procedure shall be defined and agreed between the parties involved.

Note 4 to entry: As the value r depends on the orientation of the test piece relative to the rolling direction, as well as on the strain, the symbol r can be supplemented by the angle which characterises this orientation and the plastic (engineering) strain. For example $r_{45/20}$ (see Table 1).

3.2
weighted average plastic strain ratio
$\bar{r}$
weighted average as calculated using Formula (3) of the $r_{x/y}$ values for different test piece orientations, x, where $r_{x/y}$ are determined using the same selected test method and at the same plastic (engineering) strain, y, or plastic (engineering) strain range, α - β

$$\bar{r} = \frac{r_{0/y} + r_{90/y} + 2r_{45/y}}{4} \quad (3)$$

Note 1 to entry: For some materials, other test piece orientations may be chosen, in which case formulas other than Formula (3) shall be used.

SIST Preview
(https://ecommerce.sist.si)

3.3
degree of planar anisotropy
Δr
value calculated using Formula (4) where $r_{x/y}$ values for different test piece orientations, x, are determined using the same selected test method and at the same plastic (engineering) strain, y, or plastic (engineering) strain range, α - β

SIST EN ISO 10113:2020
https://standards.iteh.ai/catalog/standards/sist/d4e81aa0-93f6-45f3-b0d6-6971c6d0c4b6/sist-en-iso-10113-2020

$$\Delta r = \frac{\left(r_{0/y} + r_{90/y} - 2r_{45/y}\right)}{2} \quad (4)$$

Note 1 to entry: For some materials, other test piece orientations may be chosen, in which case formulas other than Formula (4) shall be used.

3.4
Poisson´s ratio
ν
ratio of the elastic width strain to the elastic length strain of the material

4 Symbols

The designations of the symbols used in this document are given in Table 1.

© ISO 2020 – All rights reserved