



SLOVENSKI STANDARD SIST EN ISO 10113:2020

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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)

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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.

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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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.

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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*

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ISO 10113:2020(E)

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).

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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 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).

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.

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

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>
- 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 \(1\)](#)

$$r = \frac{\varepsilon_{p_b}}{\varepsilon_{p_a}} \quad (1)$$

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 \(2\)](#)].

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$$r = \frac{\ln\left(\frac{b_1}{b_0}\right)}{\ln\left(\frac{L_0 b_0}{L_1 b_1}\right)} \quad (2)$$

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, $\alpha - \beta$

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

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.

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, $\alpha - \beta$

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

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](#).