



SLOVENSKI STANDARD
oSIST prEN ISO 5173:2021
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Porušitveno preskušanje zvarnih spojev na kovinskih materialih - Upogibni preskusi (ISO/DIS 5173:2021)

Destructive tests on welds in metallic materials - Bend tests (ISO/DIS 5173:2021)

Zerstörende Prüfungen von Schweißnähten an metallischen Werkstoffen - Biegeprüfungen (ISO/DIS 5173:2021)

Essais destructifs des soudures sur matériaux métalliques - Essais de pliage (ISO/DIS 5173:2021)

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Destructive tests on welds in metallic materials — Bend tests

Essais destructifs des soudures sur matériaux métalliques — Essais de pliage

ICS: 25.160.40

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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).

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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 44, *Welding and allied processes*, Subcommittee SC 5, *Testing and inspection of welds*.

This third edition cancels and replaces the second edition (ISO 5173:2009+Amd 1:2011) which has been technically revised.

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

- scope updated to introduce guided transverse bend tests with a roller and longitudinal bend tests as alternative methods of testing for heterogeneous assemblies ;
- in Clause 4, the testing temperature was removed;
- sub-clause 7.2.2 modified accordingly ;
- figures corrected
- standard content updated to meet ISO requirements (creation of Clause 2, modification of Clause 3)

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.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Destructive tests on welds in metallic materials — Bend tests

1 Scope

This document specifies a method for making transverse root, face and side bend tests on test specimens taken from butt welds, butt welds with cladding (subdivided into welds in clad plates and clad welds) and cladding without butt welds, in order to assess ductility and/or absence of imperfections on or near the surface of the test specimen. It also gives the dimensions of the test specimen.

In addition, this document specifies methods to be used instead of transverse bend tests with a former for heterogeneous joints when base materials, heat affected zones and/or weld metal have a significant difference in their physical and mechanical properties in relation to bending. Guided transverse bend tests with a roller and longitudinal bend tests are alternative methods of testing for heterogeneous assemblies.

This document applies to metallic materials in all forms of product with welded joints made by any welding process.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

transverse face bend test specimen for a butt weld

TFBB

specimen for which the surface in tension is the side that contains the greater width of the weld or the side from which the welding arc was first applied, applicable to transverse butt weld specimens

NOTE 1 to entry: See Figure 1.

3.2

transverse root bend test specimen for a butt weld

TRBB

specimen for which the surface in tension is the side opposite to that of the face butt weld bend test specimen, applicable to transverse butt weld specimens

NOTE 1 to entry: See Figure 2.

ISO/DIS 5173:2021(E)**3.3****transverse side bend test specimen for a butt weld****SBB**

specimen for which the surface in tension is a cross-section of the weld

NOTE 1 to entry: See Figure 3.

3.4**longitudinal face bend test specimen for a butt weld****LFBB****longitudinal root bend test specimen for a butt weld****LRBB**

specimen whose direction is parallel to butt weld direction, applicable to face and root bend specimens

NOTE 1 to entry: See Figure 4.

3.5**face bend test specimen for cladding without a butt weld****FBC**

specimen for which the cladding is in tension, applicable to both transverse and longitudinal specimens

NOTE 1 to entry: See Figure 5.

3.6**side bend test specimen for cladding without a butt weld****SBC**

specimen for which the cross-section of the cladding overlay is in tension, applicable to both transverse and longitudinal specimens

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NOTE 1 to entry: See Figure 6.

3.7**face bend test specimen for cladding with a butt weld****FBCB****side bend test specimen for cladding with a butt weld****SBCB**

specimen for which the cladding is in tension or for which the cross-section of the cladding overlay is in tension and which contains a butt weld

NOTE 1 to entry: See Figures 7 and 8.

4 Principle

Submitting a test specimen, taken transversely or longitudinally from a welded joint, to plastic deformation by bending it, without reversing the bending direction, in such a way that one of the surfaces or cross-sections of the welded joint is in tension.

The temperature at which the tests are carried out shall be recorded (see Clause 9).

The test shall be made in accordance with one of the methods described in Clause 7.

5 Symbols and abbreviated terms

Table 1 — Symbols and abbreviated terms

Symbol/ Abbreviated term	Designation	Unit
TFBB	Transverse face bend test specimen for a butt weld	—
TRBB	Transverse root bend test specimen for a butt weld	—
SBB	Transverse side bend test specimen for a butt weld	—
LFBB	Longitudinal face bend test specimen for a butt weld	—
LRBB	Longitudinal root bend test specimen for a butt weld	—
FBC	Face bend test specimen for cladding without a butt weld	—
SBC	Side bend test specimen for cladding without a butt weld	—
FBCB	Face bend test specimen for cladding with a butt weld	—
SBCB	Side bend test specimen for cladding with a butt weld	—
<i>A</i>	minimum percentage elongation after fracture required by the material	%
<i>B</i>	width of the test specimen	mm
<i>b₁</i>	width of outside fusion line	mm
<i>d</i>	diameter of the former or the inner roller	mm
<i>D</i>	outside diameter of the pipe ^a	mm
<i>l</i>	distance between the rollers	mm
<i>L_f</i>	initial distance between contact of the roller and the centre line of the weld	mm
<i>L₀</i>	original gauge length	mm
<i>L_S</i>	maximum width of the weld after machining	mm
<i>L_t</i>	total length of the test specimen	mm
<i>r</i>	radius of the test specimen edges	mm
<i>R</i>	radius of the rollers	mm
<i>t</i>	thickness of the test piece	mm
<i>T_C</i>	thickness of the cladding	mm
<i>t_S</i>	thickness of the test specimen	mm
<i>t_w</i>	thickness of base material under cladding	mm
<i>α</i>	bending angle	°

^a The term “pipe”, alone or in combination, is used to mean “pipe”, “tube” or “hollow section (without rectangular cross section)”.

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5.1 Figures corresponding to the abbreviations

Figures 1 to 8 represent bend test specimens for butt welds and cladding.

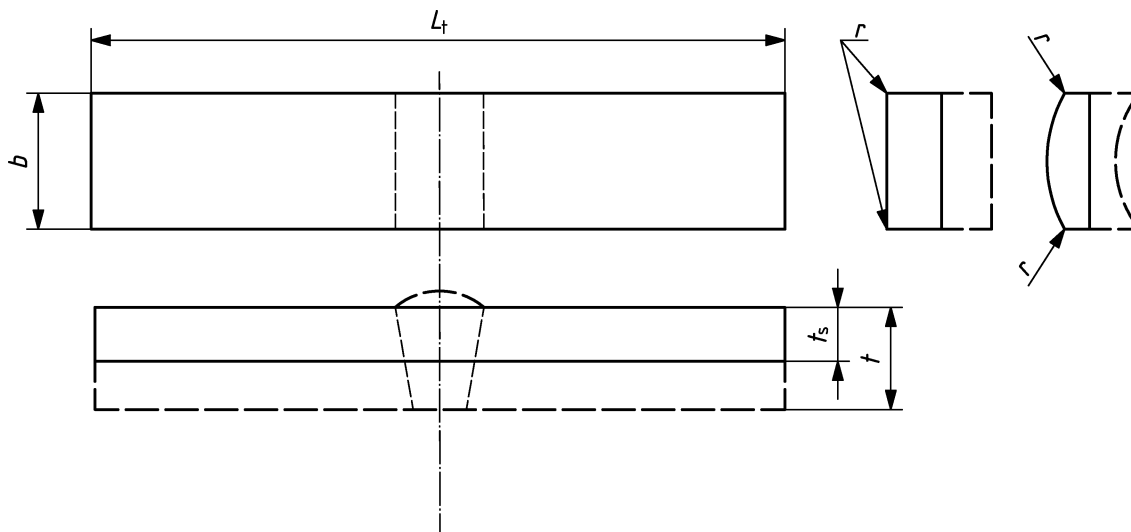


Figure 1 — Transverse face bend test specimen for a butt weld (TFBB)

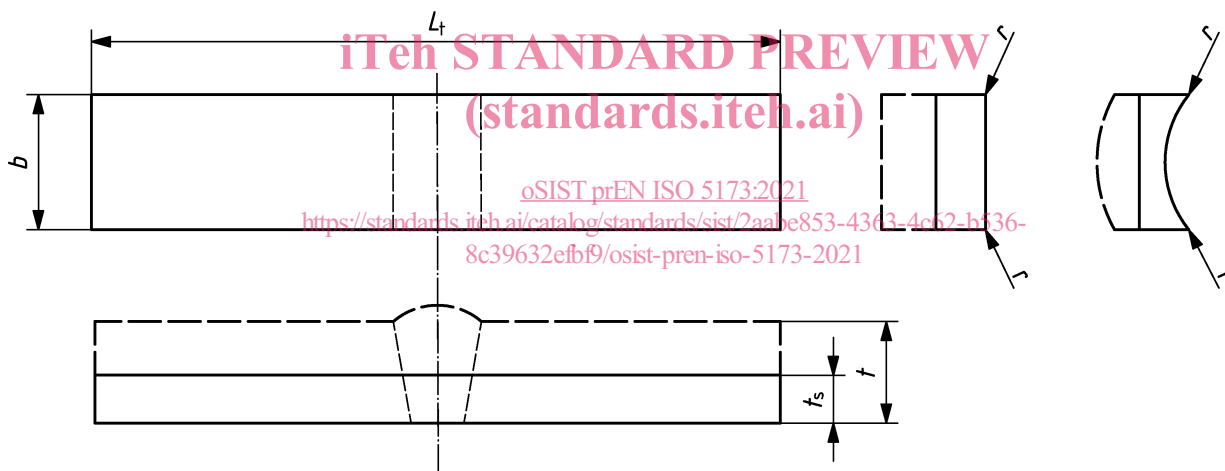


Figure 2 — Transverse root bend test specimen for a butt weld (TRBB)

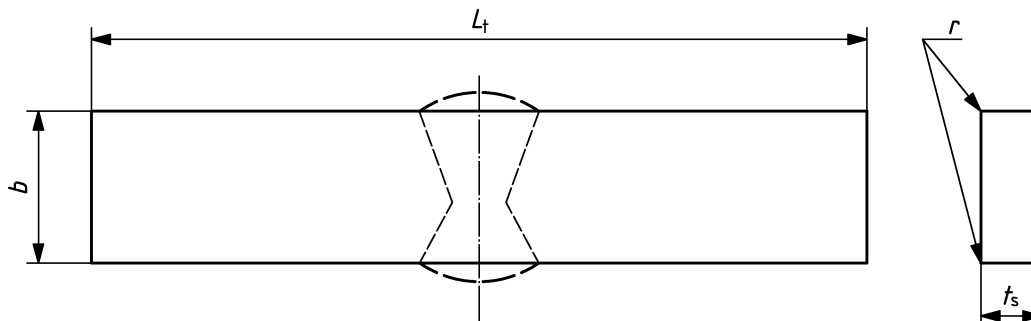


Figure 3 — Transverse side bend test specimen for a butt weld (SBB)

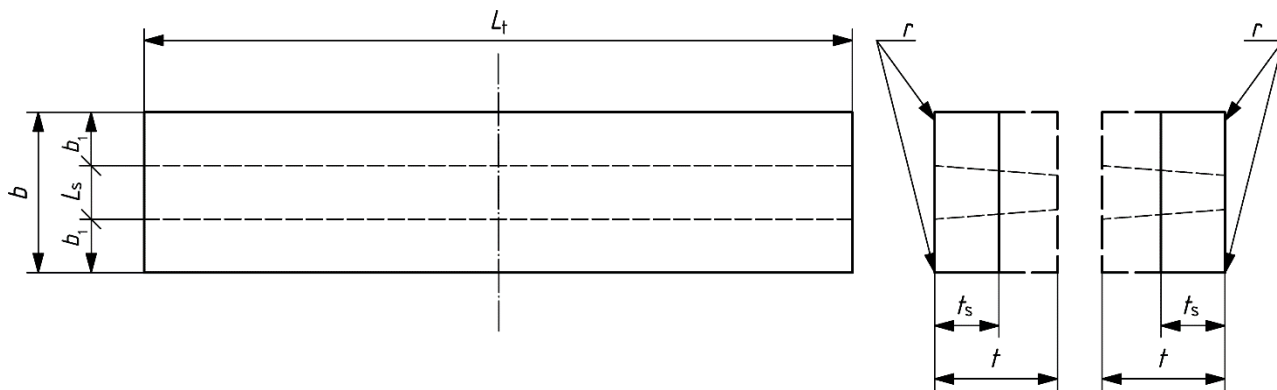


Figure 4 — Longitudinal bend test specimen for a butt weld (LFBB and LRBB)

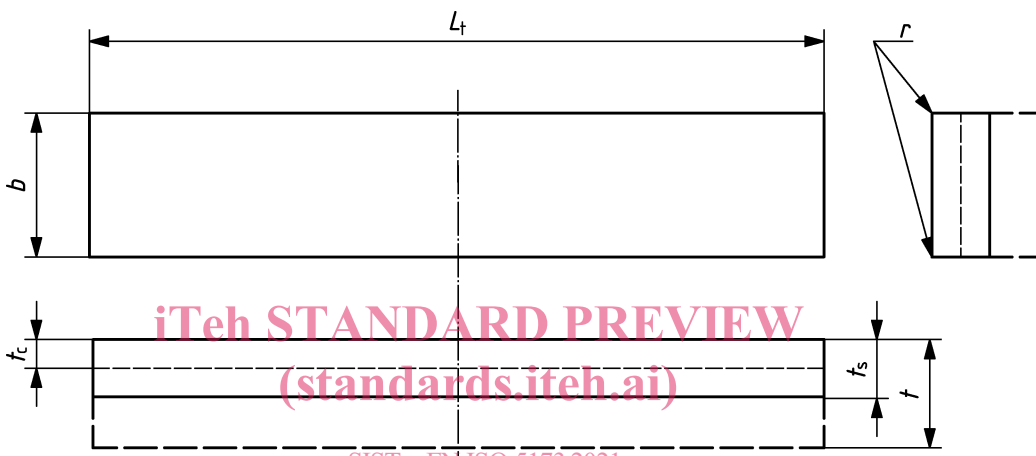


Figure 5 — Face bend test specimen for cladding without a butt weld (FBC)

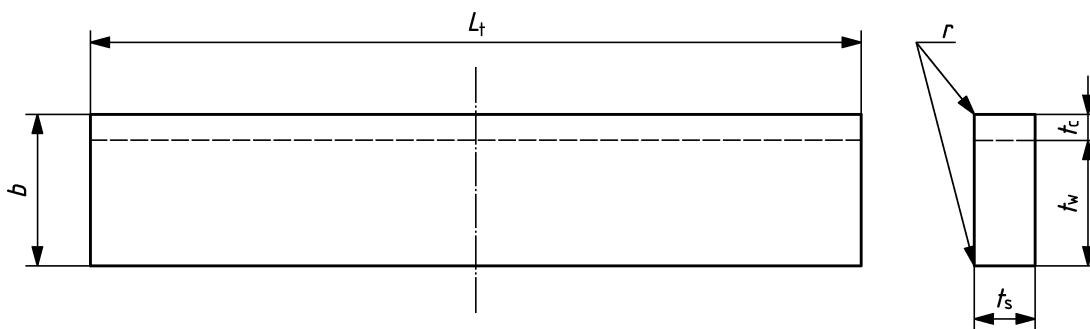


Figure 6 — Side bend test specimen for cladding without a butt weld (SBC)