



SLOVENSKI STANDARD
oSIST prEN ISO 9606:2026
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Preskušanje usposobljenosti varilcev - Talično varjenje (ISO/DIS 9606:2026)

Qualification testing of welders - Fusion welding (ISO/DIS 9606:2026)

Prüfung von Schweißern - Schmelzschweißen (ISO/DIS 9606:2026)

Épreuve de qualification des soudeurs - Soudage par fusion (ISO/DIS 9606:2026)

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25.160.10	Varilni postopki in varjenje	Welding processes

oSIST prEN ISO 9606:2026

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DRAFT International Standard

Qualification testing of welders — Fusion welding

Épreuve de qualification des soudeurs — Soudage par fusion

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ISO/DIS 9606.2

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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 document 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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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 11, *Qualification requirements for welding and allied processes personnel*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 9606 cancels and replaces ISO 9606-1:2012, ISO 9606-2:2004, ISO 9606-3:1999, ISO 9606-4:1999, and ISO 9606-5:2000.

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>.

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Introduction

A welder's ability to follow verbal or written instructions and verification of a person's skills are important factors in ensuring the quality of the welded product.

Testing a welder's skill in accordance with this document depends on the welding techniques and conditions used, in which uniform rules are conformed with, and standard test pieces are used.

When qualifying welders, the emphasis is placed on the welder's ability to manually manipulate the electrode, welding torch, welding blowpipe, or laser gun, with or without filler material, to produce a weld of acceptable quality.

The principle of this document is that a qualification test, for a particular material, qualifies a welder not only for the conditions used in the test, but also for all other conditions which are considered easier to weld in accordance with this document. It is presumed that the welder has received training and/or has industrial practice within the qualification range prior to performing the qualification test.

The qualification test can be used to qualify a welding procedure and a welder concurrently provided that all the relevant requirements, e.g. test piece dimensions and testing requirements are satisfied (see ISO 15614 series).

All new qualifications are to be in accordance with this document from its date of issue.

At the end of its period of validity, existing welder qualification tests in accordance with the requirements of ISO 9606-1, ISO 9606-2, ISO 9606-3, ISO 9606-4 and ISO 9606-5 or a national standard may be revalidated in accordance with this document, provided that that the technical intent of this document is satisfied. The new qualification range is to be interpreted according to the requirements specified in this document.

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Qualification testing of welders — Fusion welding

1 Scope

This document specifies the requirements for qualification testing of welders for fusion welding of steels, aluminium, copper, nickel, titanium and zirconium.

In this document, the terms "aluminium", "copper", "nickel", "titanium" and "zirconium" refer to the materials and their alloys.

This document provides a set of technical rules for a systematic qualification test of the welder and enables such qualifications to be uniformly accepted independently of product type, location and examiner or examining body.

The fusion welding processes referred to in this document include welding processes which are designated as manual or partly mechanized.

Qualification testing of welding operators and weld setters for mechanized and automatic welding is covered by ISO 14732.

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 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements*

ISO 3834-3, *Quality requirements for fusion welding of metallic materials — Part 3: Standard quality requirements*

ISO 4063:2023, *Welding, brazing, soldering and cutting — Nomenclature of processes and reference numbers*

ISO 5173, *Destructive tests on welds in metallic materials — Bend tests*

ISO 5817:2023, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 6520-1:2007, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding*

ISO 6947, *Welding and allied processes — Welding positions*

ISO 9017, *Destructive tests on welds in metallic materials — Fracture test*

ISO 10042:2018, *Welding — Arc-welded joints in aluminium and its alloys — Quality levels for imperfections*

ISO 10863, *Non-destructive testing of welds — Ultrasonic testing — Use of time-of-flight diffraction technique (TOFD)*

ISO 13588, *Non-destructive testing of welds — Ultrasonic testing — Use of automated phased array technology*

ISO 13919-1, *Electron and laser-beam welded joints — Requirements and recommendations on quality levels for imperfections — Part 1: Steel, nickel, titanium and their alloys*

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ISO 13919-2, *Electron and laser-beam welded joints — Requirements and recommendations on quality levels for imperfections — Part 2: Aluminium, magnesium and their alloys and pure copper*

ISO 14175, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

ISO 15608, *Welding — Grouping system for metallic materials*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

ISO 15609-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 2: Gas welding*

ISO 15609-4, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 4: Laser beam welding*

ISO 17636-1, *Non-destructive testing of welds — Radiographic testing — Part 1: X- and gamma-ray techniques with film*

ISO 17636-2, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors*

ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints*

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO/TR 25901-1, *Welding and allied processes — Vocabulary — Part 1: General terms*

ISO/TR 25901-3, *Welding and allied processes — Vocabulary — Part 3: Welding processes*

ISO/TR 25901-4, *Welding and allied processes — Vocabulary — Part 4: Arc welding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901-1, ISO/TR 25901-3, ISO/TR 25901-4 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

welder

person who holds and manipulates the electrode holder, torch, blowpipe or welding gun during welding

[SOURCE: ISO/TR 25901:2016, 2.5.24, modified — welding gun added]

3.2

manufacturer

<welding> person or organization responsible for the welding production

[SOURCE: ISO 15607:2019, 3.1]

3.3

examiner

person who has been appointed to verify conformance with the applicable standard

Note 1 to entry: In certain cases, an external independent examiner can be required.

[SOURCE: ISO/TR 25901-1:2016, 2.5.29, modified – compliance has been changed to conformance]

ISO/DIS 9606.2:2026(en)**3.4****examining body**

organization which has been appointed to verify conformance with the applicable standard

Note 1 to entry: In certain cases, an external independent examining body can be required.

[SOURCE: ISO/TR 25901-1:2016, 2.5.30, modified – compliance has been changed to conformance]

3.5**certificate**

<welder qualification> notification of attainment by the *examiner* (3.3) or *examining body* (3.4) when all qualification requirements have been satisfied

3.6**material backing**

backing using material for the purpose of supporting molten weld metal

[SOURCE: ISO/TR 25901-1:2016, 2.1.11.11]

3.7**gas backing**

backing using gas primarily for the purpose of preventing atmospheric reaction

[SOURCE: ISO/TR 25901-1:2016, 2.1.11.7]

3.8**flux backing**

backing using flux primarily for the purpose of preventing atmospheric reaction

[SOURCE: ISO/TR 25901-1:2016, 2.1.11.10]

3.9**consumable insert**

filler material that is placed at the root of the joint before welding to be completely fused into the weld metal

[SOURCE: ISO/TR 25901-1:2016, 2.1.10.2]

3.10**layer**

stratum of weld metal consisting of one or more runs

[SOURCE: ISO/TR 25901-1:2016, 2.1.8.13]

3.11**root run**

root pass

first run deposited in the root of a multi-run weld

[SOURCE: ISO/TR 25901-1:2016, 2.1.8.19]

3.12**capping run**

run(s) visible on the weld face(s) after completion of welding

[SOURCE: ISO/TR 25901-1:2016, 2.1.8.11]

3.13**deposited thickness**

penetration depth

thickness of the weld metal excluding any reinforcement

[SOURCE: ISO/TR 25901-1:2016, 2.1.7.4, modified – deposit thickness changed to deposited thickness and becomes the preferred term]

ISO/DIS 9606.2:2026(en)**3.14****leftward welding**

gas welding technique in which the filler rod is moved ahead of the blowpipe in relation to the welding direction

[SOURCE: ISO/TR 25901:2007, 2.210]

3.15**rightward welding**

gas welding technique in which the filler rod is moved behind the blowpipe in relation to the welding direction

[SOURCE: ISO/TR 25901:2007, 2.302]

3.16**branch joint**

joint of one or more tubular parts to the main pipe or to a shell or to a plate

3.17**fillet weld**

triangular weld between two or more parts for joining a T-joint, corner joint or lap joint

[SOURCE: ISO/TR 25901-1:2016, 2.1.6.11]

3.18**butt weld**

groove weld

weld other than a *fillet weld* (3.17) made in a groove or in a square preparation

[SOURCE: ISO/TR 25901-1:2016, 2.1.6.3]

3.19**verification**

confirmation, through the provision of objective evidence that specified requirements have been fulfilled

Note 1 to entry: The objective evidence needed for a verification can be the result of an inspection or of other forms of determination such as performing alternative calculations or reviewing documents.

Note 2 to entry: The activities carried out for verification are sometimes called a qualification process.

Note 3 to entry: The word “verified” is used to designate the corresponding status.

[SOURCE: ISO 9000:2015, 3.8.12]

3.20**manual welding**

welding in which the electrode holder, torch, blowpipe or welding gun is manipulated by hand

3.21**partly mechanized welding**

semiautomatic welding

manual welding (3.20) where wire feed is mechanized

[SOURCE: ISO/TR 25901-1:2016, 2.1.1.9]

3.22**waveform controlled welding**

welding process modification of the voltage and/or current wave shape to control characteristics such as droplet shape, penetration, wetting, bead shape, or transfer mode(s)

Note 1 to entry: pulsed current is considered a form of waveform control

[SOURCE: ISO/TR 18491:2019, 3.2, modified by addition of NOTE 1 to entry]

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4 Reference numbers, symbols and abbreviated terms

4.1 General

The following abbreviations and reference numbers shall be used when completing the welder's qualification test certificate in accordance with [Clause 10](#).

4.2 Welding processes and reference numbers

This document is applicable to the following manual or partly mechanized welding processes defined in ISO/TR 25901-3, with reference numbers in accordance with ISO 4063:2023:

- 111 - manual metal arc welding
- 114 - self-shielded tubular cored arc welding
- 121 - submerged arc welding with solid wire electrode
- 125 - submerged arc welding with tubular cored electrode
- 131 - MIG welding with solid wire electrode
- 132 - MIG welding with flux cored electrode
- 133 - MIG welding with metal cored electrode
- 135 - MAG welding with solid wire electrode
- 136 - MAG welding with flux cored electrode
- 138 - MAG welding with metal cored electrode
- 141 - TIG welding with solid filler material
- 142 - autogenous TIG welding
- 143 - TIG welding with tubular cored filler material
- 145 - TIG welding using reducing gas and solid filler material
- 146 - TIG welding using reducing gas and tubular cored filler material
- 147 - TAG welding (TIG welding using active gas)
- 15 - plasma arc welding
- 311 - oxyacetylene welding
- 52 - laser welding

The principles given in this document can be applied to other fusion welding processes.

4.3 Symbols and abbreviated terms

4.3.1 Welding process variants

WF - waveform controlled welding

Transfer modes in accordance with ISO 4063:2023:

D - Short-circuit transfer (dip transfer)

G - Globular transfer

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S - Spray transfer

4.3.2 Test pieces

BW – butt weld

BBW – Branch butt weld

BFW – Branch fillet weld

D – pipe outside diameter

FW – fillet weld

l_1 – test piece length

l_2 – test piece half-width

l_f – examination length

P – Plate (product form)

s – deposited thickness or fused metal thickness in butt welds (excluding any reinforcement)

T – pipe (also covers tube, all forms of hollow and solid sections)

t – test piece thickness (plate or pipe wall thickness)

z – fillet weld leg length

4.3.3 Bend testing

A - minimum percentage elongation required by the material specification

d - diameter of the former or the inner roller

t_s - bend test specimen thickness

4.3.4 Welding consumables – type of covering or core

nm - no filler material (processes 142, 15, 311, and 52, when no filler material is used)

The symbol for the type of covering or core is in accordance with ISO welding consumable standards as follows:

03 - titania basic

10 - high cellulose, sodium

11 - high cellulose, potassium

12 - high titania, sodium

13 - high titania, potassium

14 - iron powder, titania

15 - basic, sodium

16 - basic, potassium

18 - basic, potassium, iron powder

19 - iron oxide titania, potassium

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- 20 - high iron oxide
- 24 - iron powder, titania
- 27 - high iron oxide, iron powder
- 28 - low-hydrogen potassium, iron powder
- 40 - not specified
- 45 - basic, sodium (not including PF)
- 48 - basic potassium, iron powder (not including PF)
- A - acid covering
- B - basic covering or electrode core — basic
- C - cellulosic covering
- R - rutile covering or electrode core — rutile, slow-freezing slag
- RA - rutile — acid covering
- RB - rutile — basic covering
- RC - rutile — cellulosic covering
- RR - rutile — thick covering
- M - metal cored electrode or metal powder
- P - electrode core — rutile, fast-freezing slag
- S - solid wire electrode — solid rod
- V - electrode core — rutile or basic/fluoride
- W - electrode core — basic/fluoride, slow-freezing slag
- Y - electrode core — basic/fluoride, fast-freezing slag
- Z - electrode core — other types

4.3.5 Other weld details

- bs - welding from both sides
- ci - consumable insert
- fb - flux backing
- gb - gas backing
- lw - leftward welding
- mb - material backing
- ml - multi-layer
- nb - no backing
- rw - rightward welding
- sl - single layer