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Date: 22 September 2025

Origin: International

Latest date for receipt of comments: 15 November 2025

Project No. 2024/02169

Responsible committee: WEE/36 Qualification of welding personnel and welding procedures

Interested committees:

Title: Draft BS EN ISO 15614-1 Specification and qualification of welding procedures for metallic materials — Welding procedure test. Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 15614-1

Specification and qualification of welding procedures for metallic materials — Welding procedure test —

Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys

*Descriptif et qualification d'un mode opératoire de soudage pour
les matériaux métalliques — Épreuve de qualification d'un mode
opératoire de soudage —*

*Partie 1: Soudage à l'arc et aux gaz des aciers et soudage à l'arc
du nickel et des alliages de nickel*

ICS: 25.160.10

This document has not been edited by the ISO Central Secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 15614-1:2025(en)

Full document details: 25/30497921 DC

ISO/TC 44/SC 10

Secretariat: DIN

Voting begins on:
2025-09-22

Voting terminates on:
2025-12-15

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Published in Switzerland

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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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 10, *Quality management in the field of welding*, 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 third edition cancels and replaces the second edition (ISO 15614-1:2017 and ISO 15614:2017/Amd 1:2019), which has been technically revised.

The main changes are as follows:

- change of structure from two-column to single-column display of Level 1 and Level 2;
- unambiguous definition of square or rectangular hollow section under [6.2.3](#);
- steel group 11 added in [Table 3](#) (permitted maximum hardness values);
- [subclause 7.6](#) (Re-testing) restructured.
- definition of “welding under the same technical and quality control” were clarified under [subclause 8.2](#);
- [subclause 8.3.3](#) (Diameter of pipes and branch connections) for Level 2 were technical revised;
- degree of mechanization is no longer an essential requirement, see [8.4.1](#);
- welding position is no longer an essential requirement, see [8.4.2](#);
- reference to ISO 18491 were added under [subclause 8.4.7](#) (Arc energy or heat input);
- limit of 150°C were added under [subclause 8.4.9](#) (Interpass temperature);
- under Level 2, the requirements regarding submerged arc welding were revised, see [8.5.1](#);
- normative references and bibliography were updated.

A list of all parts in the ISO 15614 series can be found on the ISO website.

ISO/DIS 15614-1:2025(en)

Requests for official interpretations of any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Introduction

Two levels of welding procedure qualification tests are given to permit application to a wide range of welded fabrication. They are designated by levels 1 and 2.

Level 1 is based on requirements of ASME Section IX and level 2 is based prior editions of ISO 15614-1.

All new welding procedure qualification tests are to be performed in accordance with this document. Specification and qualification of welding procedures that were made in accordance with previous editions of this document may be used for any application for which the current edition is specified. In this case, the ranges of qualification of previous editions remain applicable.

It is possible to create a new WPQR (welding procedure qualification record) range of qualification according to this edition based on the existing qualified WPQR, provided the technical intent of the testing requirements of this document has been satisfied. Where additional tests have to be carried out to make the qualification technically equivalent, it is only necessary to perform the additional test on a test piece.

Specification and qualification of welding procedures for metallic materials — Welding procedure test —

Part 1:

Arc and gas welding of steels and arc welding of nickel and nickel alloys

1 Scope

This document specifies how a preliminary welding procedure specification is qualified by welding procedure tests according to the principles given in ISO 15607.

This document applies to production welding, repair welding and build-up welding.

This document defines the conditions for the execution of welding procedure qualification tests and the range of qualification for welding procedures for all practical welding operations within the qualification of this document.

The primary purpose of welding procedure qualification is to demonstrate that the joining process proposed for construction is capable of producing welded joints having the required mechanical properties for the intended application.

Two levels of welding procedure tests are given to permit application to a wide range of welded fabrications. They are designated by levels 1 and 2. For level 2 the extent of testing is greater, and the ranges of qualification are more restrictive than in level 1.

Welding procedure qualification tests carried out to level 2 automatically qualify for level 1 requirements, but not vice-versa.

When no level is specified in a contract or application standard, all the requirements of level 2 apply.

This document applies to the arc and gas welding of steels in all product forms and the arc welding of nickel and nickel alloys in all product forms.

Arc and gas welding are covered by the following processes in accordance with ISO 4063:2023.

111 — manual metal arc welding (metal-arc welding with covered electrode);

114 — self-shielded tubular-cored arc welding;

12 — submerged arc welding;

13 — gas-shielded metal arc welding;

14 — gas-shielded arc welding with non-consumable electrode;

15 — plasma arc welding;

311 — oxy-acetylene welding.

NOTE A former process number does not require a new qualification test according to this document.

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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

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

ISO 4136, *Destructive tests on welds in metallic materials — Transverse tensile test*

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 9015-1, *Destructive tests on welds in metallic materials — Hardness testing — Part 1: Hardness test on arc welded joints*

ISO 9016, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination*

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

ISO 14175:2008, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

ISO/DIS 15608, *Welding — Guidelines for a metallic materials grouping system*

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 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test*

ISO 16828, *Non-destructive testing — Ultrasonic testing — Time-of-flight diffraction technique for detection and sizing of discontinuities*

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 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO 17639, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

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

ISO/DIS 18491, *Welding and allied processes — Guidelines for measurement of welding energies*

ISO/TR 20172, *Welding — Grouping systems for materials — European materials*

ISO/TR 20173, *Welding — Grouping systems for materials — American materials*

ISO/TR 20174, *Welding — Grouping systems for materials — Japanese materials*

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, -3 and -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 build-up welding

addition of weld metal to obtain or restore required dimensions

3.2 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]

3.3 branch connection

a joint between a pipe or hollow section and the main pipe or a plate.

4 Preliminary welding procedure specification (pWPS)

A preliminary welding procedure specification shall be prepared in accordance with ISO 15609-1 for arc welding or ISO 15609-2 for gas welding.

5 Welding procedure test

Test pieces shall be welded and tested in accordance with [Clauses 6](#) and [7](#).

The welding procedure qualification test can be used to qualify a welding procedure and a welder or welding operator concurrently, provided that all the requirements of the welder or welding operator qualification standard are met.

6 Test piece

6.1 General

The welded joint to which the welding procedure will relate in production shall be represented by making a standard test piece or test pieces in accordance with [6.2](#).

If required by the application standard, the direction of plate rolling shall be marked on the test piece. This is when impact tests are required to be taken in the Heat Affected Zone (HAZ) and shall be mentioned in the impact test report.

6.1.1 Level 1

Any butt joint test qualifies all joint configurations.

6.1.2 Level 2

Where the joint requirements and/or dimension of the test piece are not covered by the standard test pieces given in this document, ISO 15613 shall be used.

6.2 Shape and dimensions of test pieces

6.2.1 General

The length or number of test pieces shall be sufficient to allow all required tests to be performed.

When extra testing and/or re-testing specimens are required then additional test pieces or longer test pieces shall be prepared in accordance with [7.6](#).

For all test pieces except branch connections (see [Figure 4](#)) and T-joints (T-butt welds or fillet welds, see [Figure 3](#)), the material thickness, t , and the diameter, D , shall be the same for both plates and pipes on the required length of the test piece to be welded.

The thickness and/or pipe outside diameter of the test pieces shall be selected in accordance with [8.3.2](#) to [8.3.3](#).

6.2.2 Butt joint in plate with full penetration

The test piece shall be prepared in accordance with [Figure 1](#).

6.2.3 Butt joint in pipe with full penetration

The test piece shall be prepared in accordance with [Figure 2](#).

The word “pipe”, alone or in combination, is used to mean “pipe”, “tube” or “hollow section”. This includes square or rectangular hollow sections where the shortest side is < 50 mm. Square or rectangular hollow sections where the shortest side is ≥ 50 mm shall be qualified as plate.

6.2.4 T-joint

The test piece shall be prepared in accordance with [Figure 3](#). This test piece applies to full penetration butt welds or fillet welds.

6.2.5 Branch connection

6.2.5.1 General

The requirements for levels 1 and 2 are given in [6.2.5.2](#) and [6.2.5.3](#).

6.2.5.2 Level 1

No specific test piece required.

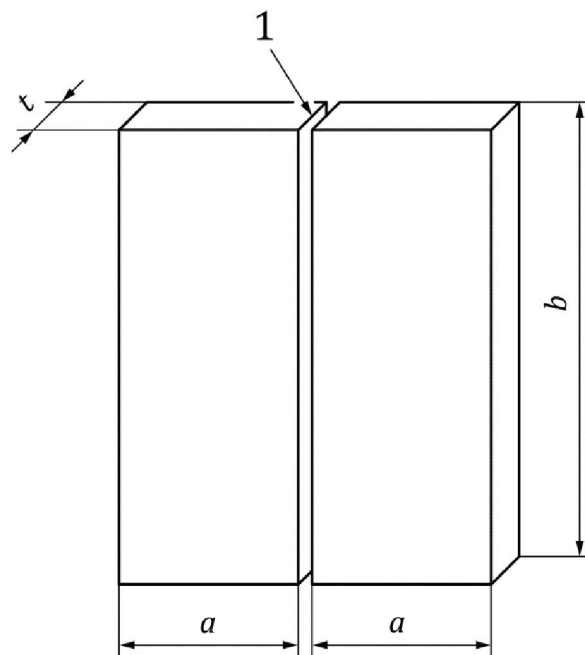
6.2.5.3 Level 2

The test piece shall be prepared in accordance with [Figure 4](#). The angle α is the minimum to be used in production. This test piece applies to full penetration welds (set-on, set-in or set-through joint) and for fillet welds. The main pipe can be a plate.

6.3 Welding of test pieces

Preparation and welding of test pieces shall be carried out in accordance with the pWPS, that they shall represent. Welding positions and limitations for the angle of slope and rotation of the test piece shall be in accordance with ISO 6947.

The welding of the test piece shall be witnessed by the examiner or examining body.



Key

- 1 joint preparation and fit-up as detailed in the preliminary welding procedure specification (pWPS)
- a minimum dimension 150 mm
- b minimum dimension 350 mm
- t material thickness

Figure 1 — Test piece for a butt joint in plate with full penetration