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

**Part 7:
Overlay welding**

iTeh STANDARD PREVIEW
*Descriptif et qualification d'un mode opératoire de soudage pour les
matériaux métalliques — Épreuve de qualification d'un mode opératoire
de soudage —*
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Partie 7: Rechargement par soudage

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 15614-7 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding*, in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 15614 consists of the following parts, under the general title *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
- Part 2: Arc welding of aluminium and its alloys
- Part 3: Fusion and pressure welding of non-alloyed and low-alloyed cast irons
- Part 4: Finishing welding of aluminium castings
- Part 5: Arc welding of titanium, zirconium and their alloys
- Part 6: Arc and gas welding of copper and its alloys
- Part 7: Overlay welding
- Part 8: Welding of tubes to tube-plate joints
- Part 10: Hyperbaric dry welding
- Part 11: Electron and laser beam welding
- Part 12: Spot, seam and projection welding
- Part 13: Resistance butt and flash welding

Requests for official interpretations of any aspect of this part of ISO 15614 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

This part of ISO 15614 is part of a series of standards. Details of this series are given in ISO 15607:2003, Annex A.

Previous procedure qualifications to former national standards or specifications should be taken into consideration at the time of the enquiry or contract stage and agreed between the contracting parties.

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

Part 7: Overlay welding

1 Scope

This part of ISO 15614 specifies how a preliminary welding procedure specification for overlay welding is qualified by welding procedure tests.

This part of ISO 15614 defines the conditions for carrying out welding procedure tests and the range of qualification for welding procedures for all practical welding operations within the range of variables listed in Clause 8.

Additional tests may be required by application standards.

This part of ISO 15614 applies to all welding processes suitable for overlay welding.

This part of ISO 15614 is applicable to all new welding procedures. However, it does not invalidate previous welding procedure tests made to former national standards or specifications. Where additional tests are carried out to make the qualification technically equivalent, they are only done on a test piece made in accordance with this part of ISO 15614.

This part of ISO 15614 does not apply to overlay welding where cracks are intentionally produced (e.g. special hardfacing applications).

2 Normative references

The following referenced documents are indispensable for the application 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 3452, *Non destructive testing — Penetrant inspection — General principles*

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

ISO 6947, *Welds — Working positions — Definitions of angles of slope and rotation*

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

ISO 14174, *Welding consumables — Fluxes for submerged arc welding — Classification*

ISO 14175, *Welding consumables — Shielding gases for arc welding and cutting*

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

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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 15609-3, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 3: Electron beam welding*

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

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

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*

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

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

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing of welded joints*

ISO/TR 25901¹⁾, *Welding and related processes — Vocabulary*

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO/TR 25901 apply.

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4 Preliminary welding procedure specification (pWPS)

4.1 Overlay welding

The pWPS shall be in accordance with ISO 15609-1, ISO 15609-3 and ISO 15609-4. It shall specify the tolerances for all the relevant parameters.

The welding procedure shall be qualified in accordance with Clauses 5 to 8.

4.2 Hardfacing

The pWPS shall be in accordance with ISO 15609-1, ISO 15609-2, ISO 15609-3 and ISO 15609-4. It shall specify the tolerances for all the relevant parameters.

The welding procedure shall be qualified in accordance with Clauses 5 to 8.

1) To be published (revision of CEN/TR 14599).

4.3 Building-up

The pWPS shall be in accordance with ISO 15609-1. It shall specify the tolerances for all the relevant parameters.

The welding procedure shall be qualified in accordance with ISO 15613 or ISO 15614-1 and Clauses 5 to 8.

4.4 Buttering

The pWPS shall be in accordance with ISO 15609-1. It shall specify the tolerances for all the relevant parameters.

If buttering is used for welding between dissimilar materials, the welding procedure shall be qualified in accordance with ISO 15614-1.

If buttering is used to produce a metallurgically compatible weld metal between the parent material and overlay welding or hardfacing, the welding procedure shall be qualified in accordance with ISO 15614-1 and Clauses 5 to 8.

5 Welding procedure test

A test piece shall be welded using the same welding processes as the ones to be used in production (e.g. strip overlay welding + manual metal arc overlay welding with covered electrode).

The welding and testing of test pieces shall be in accordance with Clauses 6 and 7.

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6 Test piece

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6.1 Shape and dimensions of test pieces

6.1.1 General

The welding procedure test shall be carried out on standardized test piece(s) in accordance with Figures 1 and 2, and 6.2. Parent material(s) shall be used which represent the material(s) to be welded in production.

The dimensions and/or number of test pieces shall be sufficient to allow all required tests to be carried out (see Figures 1 and 2).

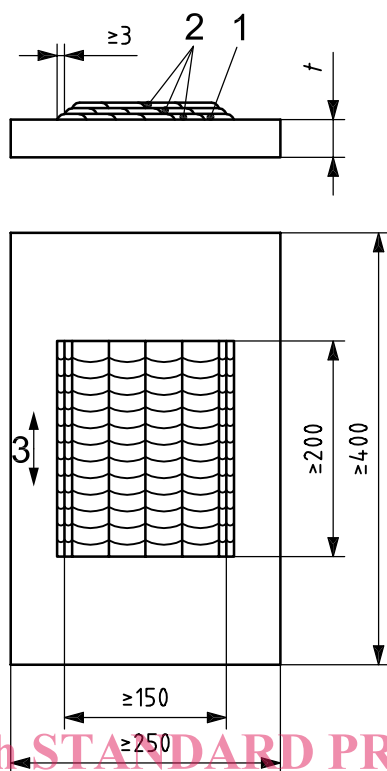
The thickness and/or diameter of the test pieces shall be selected in accordance with the range of qualification.

6.1.2 Overlay welding and hardfacing

A minimum of three beads for the last layer is required.

6.1.3 Buffer layer

If a buffer layer is used in production welding, it shall be used in welding the test piece.



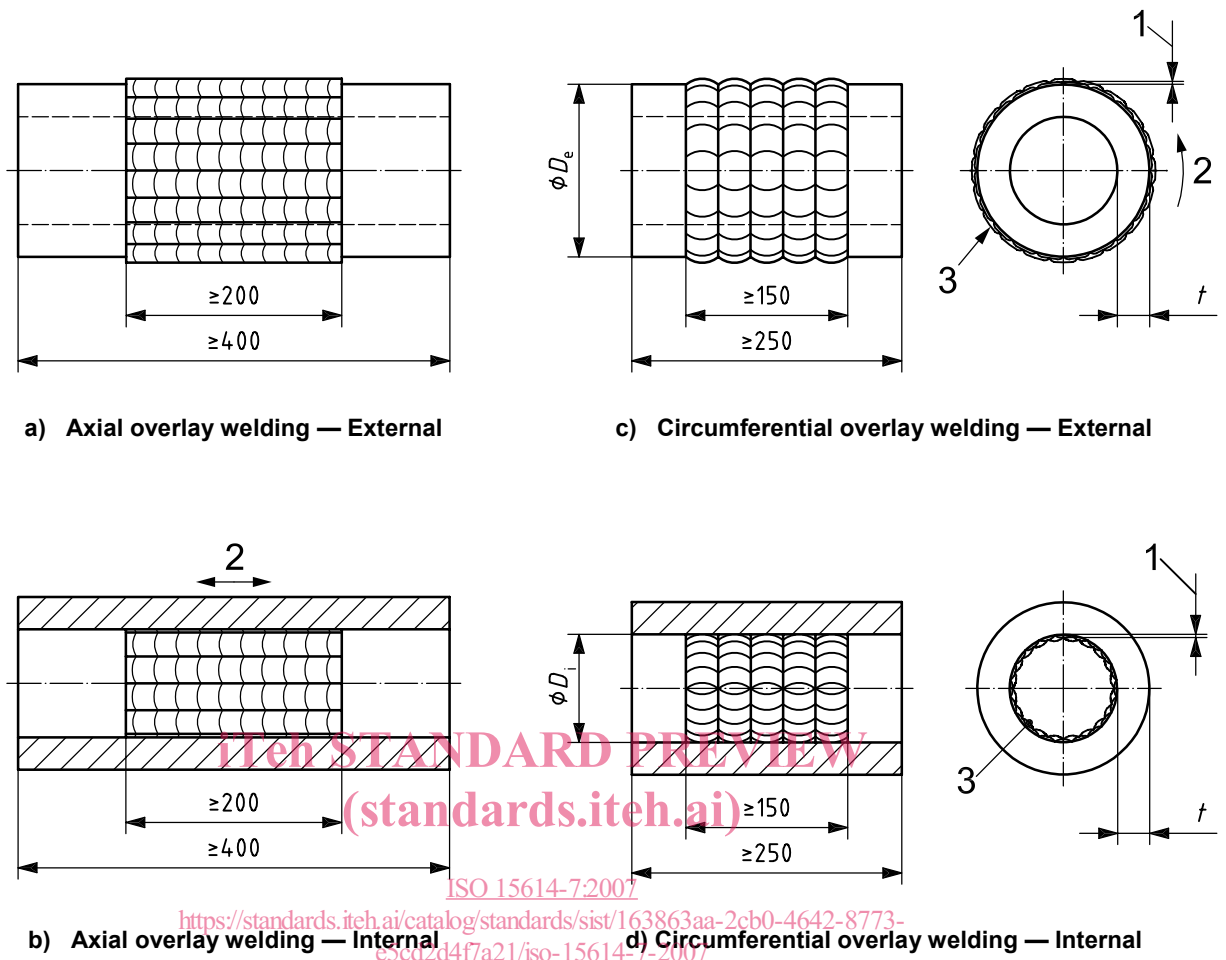
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Key

- 1 buttering layer, if necessary
- 2 number of layers in accordance with the pWPS (see 6.1.2) or thickness of overlay deposit
- 3 welding direction
- t parent material thickness

Figure 1 — Test piece — Plate

Dimensions in millimetres



Key

- 1 buttering layer, if necessary
- 2 welding direction
- 3 number of layers in accordance with the pWPS (see 6.1.2 and 6.1.3)

D_e outside diameter of tube

D_i inside diameter of tube

t parent material thickness

Figure 2 — Test piece — Tube

6.2 Welding of test pieces

Preparation and welding of test pieces shall be carried out in accordance with the pWPS and under the general conditions in production that they shall represent.

Welding and testing of the test pieces shall be witnessed by an examiner or an examining body.