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

Part 2:

Arc welding of aluminium and its alloys

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

Partie 2: Soudage à l'arc de l'aluminium et de ses alliages



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

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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 15614-2 was prepared by the European Committee for Standardization (CEN) 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).

Throughout the text of this document, read “this European Standard...” to mean “...this International Standard...”.

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: Arc welding of cast iron*
- *Part 4: Finishing welding of aluminium castings*
- *Part 5: Arc welding of titanium, zirconium and their alloys*
- *Part 6: Arc welding of copper and its alloys*
- *Part 7: Corrosion resistant overlay, cladding restore and hardfacing*
- *Part 8: Welding of tubes to tube-plate joints*
- *Part 9: Arc underwater hyperbaric wet welding*
- *Part 10: Underwater hyperbaric dry welding*
- *Part 11: Electron and laser beam welding*
- *Part 12: Spot, seam and projection welding*
- *Part 13: Resistance butt and flash welding*

Annex ZB provides a list of corresponding International and European Standards for which equivalents are not given in the text.

For the purposes of this part of ISO 15614, the CEN annex regarding fulfilment of European Council Directives has been removed.

Contents

Page

Foreword.....	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Preliminary welding procedure specification (pWPS)	2
5 Welding procedure test	2
6 Test piece	3
6.1 General.....	3
6.2 Shape and dimensions of test pieces	3
6.3 Welding of test pieces	7
7 Examination and testing	7
7.1 Extent of testing.....	7
7.2 Location of test specimens	8
7.3 Non-destructive testing.....	12
7.4 Destructive tests	12
7.5 Acceptance levels.....	15
7.6 Re-testing	15
8 Range of qualification	16
8.1 General.....	16
8.2 Related to the manufacturer.....	16
8.3 Related to the parent material	16
8.4 Common to all welding procedures.....	19
8.5 Specific to processes.....	22
9 Welding procedure qualification record (WPQR)	22
Annex A (informative) Welding Procedure Qualification Record form (WPQR)	24
Annex ZB (normative) Normative references to international publications with their relevant European publications	27
Bibliography	29

Figures

Figure 1 — Test piece for a butt joint in plate with full penetration	4
Figure 2 — Test piece for a butt joint in pipe with full penetration	5
Figure 3 — Test piece for a T-joint.....	5
Figure 4 — Test piece for a branch connection	7
Figure 5 — Location of test specimens for a butt joint in plate	9
Figure 6 — Location of test specimens for a butt joint in pipe	10
Figure 7 — Location of test specimens for a T-joint.....	11
Figure 8 — Location of test specimens for a branch connection or a fillet weld on pipe	11

Tables

Table 1 — Examination and testing of the test pieces	8
Table 2 — Efficiency for tensile strength of butt joints	13
Table 3 — Examples of maximum calculated former diameter for some elongations and thicknesses	15
Table 4 — Range of qualification for similar and dissimilar metal joints	17
Table 5 — Range of qualification for parent material thickness for plates and pipes	18
Table 6 — Range of qualification for the throat thickness for plates and pipes	19
Table 7 — Range of qualification for pipe and branch connection diameters.....	19
Table 8 — Range of qualification for type of joint	21

Foreword

This document (EN ISO 15614-2:2005) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN.

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 October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

This document supersedes EN 288-4:1992.

EN 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: Welding procedure tests for the arc welding of cast iron ¹⁾*
- *Part 4: Finishing welding of aluminium castings ¹⁾*
- *Part 5: Arc welding of titanium, zirconium and their alloys*
- *Part 6: Arc welding of copper and its alloys ¹⁾*
- *Part 7: Overlay welding ¹⁾*
- *Part 8: Welding of tubes to tube-plate joints*
- *Part 10: Hyperbaric dry welding ¹⁾*
- *Part 11: Electron and laser beam welding*
- *Part 12: Spot, seam and projection welding*
- *Part 13: Resistance butt and flash welding ¹⁾*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

¹⁾ To be published.

Introduction

All new welding procedure tests are to be carried out in accordance with this document from the date of this issue.

However, this document does not invalidate previous welding procedure tests made to former standards or specifications of previous issues of this document.

Where additional tests have to be carried out to make the qualification technically equivalent, it is only necessary to do the additional tests on a test piece which should be made in accordance with this document.

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 which can be found at www.iso.org.

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1 Scope

This document specifies how a preliminary welding procedure specification is qualified by welding procedure tests.

This document is part of a series of standards, details of this series are given in EN ISO 15607:2003, Annex A.

This document defines the conditions for the execution of 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.

This document applies to the arc welding of wrought and cast aluminium and its alloys. In this document the term aluminium stands for aluminium and for aluminium alloys.

This document does not apply to finishing welding of aluminium castings which is dealt by prEN ISO 15614-4.

Arc welding of aluminium is covered by the following welding processes in accordance with EN ISO 4063:

- 131 : metal inert gas welding (MIG welding);
- 141 : tungsten inert gas welding (TIG welding);
- 15 : plasma arc welding.

NOTE Specific service, material or manufacturing conditions may require more comprehensive testing than is specified by this document (see 7.1).

The principles of this document may be applied to other fusion welding processes.

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.

EN 515, *Aluminium and aluminium alloys — Wrought products — Temper designations*.

EN 571-1, *Non destructive testing — Penetrant testing — Part 1: General principles*.

EN 1714, *Non-destructive examination of welds — Ultrasonic examination of welded joints*.

EN ISO 6947, *Welds — Working positions — Definitions of angles of slope and rotation (ISO 6947:1993)*.

EN ISO 9606-2, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*.

EN ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*.

EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*.

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test (ISO 15613:2004)*.

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

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

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

ISO 10042, *Arc-welded joints in aluminium and its weldable alloys — Guidance on quality levels for imperfections.*

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

ISO 14732, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials.*

ISO 17635, *Non-destructive testing of welds — General rules for fusion welds in metallic materials .*

ISO 17636, *Non-destructive testing of welds — Radiographic testing of fusion-welded joints.*

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/TR 15608, *Welding — Guidelines for a metallic material grouping system.*

ISO/TR 17671-1, *Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding.*

ISO/TR 17671-4, *Welding — Recommendations for welding of metallic materials — Part 4: Arc welding of aluminium and aluminium alloys.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 15607:2003 and the following apply.

3.1

finishing welding

welding carried out during production in order to remove casting defects and core openings to ensure the agreed quality of castings

4 Preliminary welding procedure specification (pWPS)

The preliminary welding procedure specification shall be prepared in accordance with EN ISO 15609-1. It shall specify the tolerance for all the relevant parameters.

Guidance for the welding of aluminium is given in ISO/TR 17671-1 and ISO/TR 17671-4.

5 Welding procedure test

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