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

Part 12: Spot, seam and projection welding

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

Partie 12: Soudage par points, à la molette et par bossages

Reference number
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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 6, *Resistance welding and allied mechanical joining,* 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 15614-12:2014), which has been technically revised.

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

— Clause 2 and the Bibliography have been updated;

— Clauses 7 and 8 have been updated;

— Table 1 has been modified;

— ISO 14732 has been added to the Bibliography and has replaced EN 1418.

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

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

It is intended that all new welding procedure qualifications be carried out in accordance with this document from the date of its issue.

However, this document does not invalidate previous welding procedure qualifications made to other standards or specifications, provided the intent of its technical requirements is satisfied and the previous welding procedure qualifications are relevant to the application and production work on which they are to be employed.

Also, where additional tests need to be carried out to make the qualification technically equivalent, it is necessary only to perform the additional tests on a test piece made in accordance with this document.

Details on the ISO 15614 series on welding are given in ISO 15607:2019, Annex A.

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

Part 12: Spot, seam and projection welding

1 Scope

This document specifies the tests which can be used for qualification of welding procedure specifications for spot, seam, and projection welding processes.

NOTE The procedures are written for embossed projection welding. They can be adapted for solid projections as well, e.g. nut welding, stud welding. cross wire welding.

This document defines the conditions for carrying out tests and the limits of validity of a qualified welding procedure for all practical welding operations covered by this document.

It covers the following resistance welding processes, as defined in ISO 4063:

— 21 – resistance spot welding;
  — 211 – indirect spot welding;
  — 212 – direct spot welding;
— 22 – resistance seam welding;
  — 221 – lap seam welding;
  — 222 – mash seam welding;
  — 223 – Prep-lap seam welding;
  — 224 – Wire seam welding;
  — 225 – foil butt-seam welding;
  — 226 – seam welding with strip;
— 23 – projection welding;
  — 231 – indirect projection welding;
  — 232 – direct projection welding.

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 669:2016, *Resistance welding — Resistance welding equipment — Mechanical and electrical requirements*

ISO 15607:2019, *Specification and qualification of welding procedures for metallic materials — General rules*

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ISO 15609-5:2011, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding*

ISO 17653:2012, *Resistance welding — Destructive tests on welds in metallic materials — Torsion test of resistance spot welds*

ISO 17677-1:2019, *Resistance welding — Vocabulary — Part 1: Spot, projection and seam welding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 669, ISO 15607 and ISO 17677-1 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/

4 Preliminary welding procedure specification (pWPS)

The preliminary welding procedure specification shall be prepared in accordance with ISO 15609-5.

5 Welding procedure test

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

6 Test piece

6.1 General

The welded assembly to which the welding procedure will relate to in production shall be represented by actual components or by preparing a standardized test piece in accordance with 6.2.

Test specimens shall be cut from the actual components; the test piece is welded separately according to 6.3. Test specimens or test pieces from the same material(s) with relevant flange widths or overlap length should be used. When applicable, shunting and inductive effects shall be taken into account.

If required by the application standard, the direction of plate rolling shall be recorded and/or marked on the test piece.

6.2 Shape and dimensions of test pieces and test specimens for destructive testing

6.2.1 General

The shape and dimensions of the test pieces and test specimens and the test procedures are specified in ISO 14270, ISO 14271, ISO 14272, ISO 14273, ISO 17653, ISO 10447 and ISO 17654.

6.2.2 Macrosection

The test specimens shall be prepared and etched to produce transverse and/or longitudinal sections in order to clearly show the nugget, the heat affected zone (HAZ) and, if necessary, the weld profile.

The transverse macrosection shall include the unaffected parent material.

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