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

**Part 13:
Upset (resistance butt) and flash
welding**

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

*Partie 13: Soudage en bout par résistance pure et soudage par
étincelage*



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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*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 15614-13:2012), which has been technically revised.

The main changes are as follows:

- petal test was changed to bend test and bend test was changed to three-point bend test;
- [Clauses 2](#) and [3](#) have been updated;
- [Clauses 7](#) and [8](#) have been updated;
- [Table 1](#) has been modified.

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>.

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.

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

Part 13:

Upset (resistance butt) and flash welding

1 Scope

This document specifies tests for the qualification of welding procedure specifications applicable to upset (resistance butt) welding and flash welding of metallic materials, e.g. with solid, tubular, flat or circular cross-section. Its basic principles can also be applied to other resistance welding processes when this is stated in the specification.

This document defines the conditions for carrying out tests and the limits of validity of a qualified welding procedure for all the practical welding operations that it covers.

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

- 24 flash welding, using direct current or alternating current with various movement sequences, constant flashing and pulsed flashing;
- 25 resistance upset welding, using direct current or alternating current with various pressure sequences.

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, *Resistance welding — Resistance welding equipment — Mechanical and electrical requirements*

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

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

ISO 6520-2, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 2: Welding with pressure*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

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

ISO 9015-2, *Destructive tests on welds in metallic materials — Hardness testing — Part 2: Microhardness testing of welded joints*

ISO 11666, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels*

ISO 14271, *Resistance welding — Vickers hardness testing (low-force and microhardness) of resistance spot, projection, and seam welds*

ISO 14732, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials*

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

ISO/TR 15608:2017, *Welding — Guidelines for a metallic materials grouping system*

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

ISO 15620:2019, *Welding — Friction welding of metallic materials*

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 17643, *Non-destructive testing of welds — Eddy current testing of welds by complex-plane analysis*

ISO 23277, *Non-destructive testing of welds — Penetrant testing — Acceptance levels*

ISO 23278, *Non-destructive testing of welds — Magnetic particle testing — Acceptance levels*

ISO 23279, *Non-destructive testing of welds — Ultrasonic testing — Characterization of discontinuities in welds*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 669, ISO 15607 and ISO 6520-2 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 <http://www.electropedia.org/>

4 Preliminary welding procedure specification

4.1 General

The preliminary welding procedure specification (pWPS) shall be prepared in accordance with ISO 15609-5. It shall specify all relevant parameters and requirements.

4.2 Welding procedure test

The manufacturing and testing of components and/or test pieces representing the type of welding used in production shall be in accordance with [Clauses 5](#) and [6](#).

The resistance weld setter who satisfactorily undertakes the welding procedure test in accordance with this part of ISO 15614 shall be qualified for the appropriate range of qualification given in ISO 14732.