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Brazing — Specification and qualification of brazing procedures for metallic materials

Brasage fort — Descriptif et qualification d'un mode opératoire de brasage fort pour les matériaux métalliques

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes,* Subcommittee SC 11, *Qualification requirements for welding and allied processes personnel*, 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 second edition cancels and replaces the first edition (ISO 17779:2021), which has been technically revised.

The main changes are as follows:

— in general, all requirements have been clarified by use of suitable revisions;

— introduction has been revised to match text used in ISO/DIS 15614-1;

— reference to Annex A has been moved from the scope to 7.5;

— reference to ISO 857-2 has been deleted from the scope;

— scope revised by removing the statement: “The principles of this document can be applied to other brazing processes and brazing of materials not listed";

— normative references in Clause 2 have been updated;

— in 7.2, 7.3, 7.4.2, 7.4.3, 7.4.4 and 7.4.5, the use of technically equivalent standards is no longer permitted

— in Table 4, the footnotes have been revised for clarity;

— in 8.7, the use of other standards that provide equivalent technical conditions is no longer permitted;

— ISO 11745 has been added to a new bibliography.

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

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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

The purpose of this document is to provide a general set of rules for brazing procedure qualification independent of product or application.

All new brazing procedure qualification tests are intended to be performed in accordance with this document. Specification and qualification of brazing 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.

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

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Brazing — Specification and qualification of brazing procedures for metallic materials

1 Scope

This document specifies requirements for the specification and qualification of brazing procedures for brazing of metallic materials.

This document specifies requirements for brazing of the test piece, testing of the test specimen, essential variables and their range of qualification, acceptance criteria, brazing procedure qualification record (BPQR) and brazing procedure specification (BPS).

This document does not cover testing of residual stresses, corrosion resistance and impact properties.

This document applies to the following brazing processes according to ISO 4063:2023 with local and global heating:

— 911 Infrared brazing;

— 912 Flame brazing, torch brazing;

— 913 Laser beam brazing;

— 914 Electron beam brazing;

— 916 Induction brazing;

— 918 Resistance brazing;

— 919 Diffusion brazing;

— 921 Furnace brazing;

— 922 Vacuum brazing;

— 923 Dip-bath brazing;

— 924 Salt-bath brazing;

— 925 Flux bath brazing;

— 926 Immersion brazing;

— 972 Arc weld brazing.

This document does not apply to brazing for aerospace applications covered by ISO 11745.

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

ISO 18279:2023, *Brazing — Imperfections in brazed joints*

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EN 12797, *Brazing — Destructive tests of brazed joints*

EN 12799, *Brazing — Non-destructive examination of brazed joints*

ISO 857-2, *Welding and allied processes — Vocabulary — Part 2: Soldering and brazing processes and related terms*

ISO 13585, *Brazing — Qualification testing of brazers and brazing operators*

ISO 17672, *Brazing — Filler metals*

ISO 18496, *Brazing — Fluxes for brazing — Classification and technical delivery conditions*

ISO/TR 25901-1, *Welding and allied processes — Vocabulary — Part 1: General terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 857-2, ISO/TR 25901-1 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
brazing
joining process using filler metal with a liquidus temperature above 450 °C

[SOURCE: ISO 857-2:2005, 3.1.2.]

3.2
brazing procedure specification
BPS
document that has been qualified and provides the required variables of the brazing procedure to ensure repeatability during production brazing

3.3
preliminary brazing procedure specification
pBPS
document containing the required variables of the brazing procedure which is not yet qualified

3.4
brazing procedure qualification record
BPQR
record comprising all necessary data from qualification of a brazing procedure

3.5
manufacturer
workshop or site or both which is (are) under the same technical and quality management

3.6
examiner
person who has been appointed to verify conformance with the applicable standard

Note 1 to entry: In certain cases, an external independent examiner can be required.

[SOURCE: ISO/TR 25901-1:2016, 2.5.29, modified — compliance has been changed to conformance.]

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3.7
examining body
organization that has been appointed to verify conformance with the applicable standard

Note 1 to entry: In certain cases, an external independent examining body can be required.

[SOURCE: ISO/TR 25901-1:2016, 2.5.30, modified — compliance has been changed to conformance.]

3.8
filler metal
added metal applied to brazed joints

Note 1 to entry: Filler metal can be in the form of wire, inserts, powder, pastes, foil, etc.

3.9
flux
non-metallic material which, when molten, promotes wetting by removing existing oxide or other detrimental films from the surfaces to be joined and prevents their re-formation during the joining operation

[SOURCE: ISO 857-2:2005, 3.2.2]

3.10
test piece
brazed assembly which is used for testing purposes

3.11
test specimen
part or portion cut from the test piece in order to perform specified destructive testing

[SOURCE: ISO/TR 25901-1:2016, 2.2.1.6]

4 Preliminary brazing procedure specification (pBPS)

A preliminary brazing procedure specification shall be prepared. An example pBPS form is shown in Annex B.

5 Brazing procedure test

The brazing and testing of test pieces shall be in accordance with Clause 6 and Clause 7.

A brazer or brazing operator who undertakes the brazing procedure test satisfactorily in accordance with this document shall be considered qualified for the appropriate range of qualification in accordance with ISO 13585, provided that the relevant testing requirements are met.

6 Test piece

6.1 General

The test piece or pieces shall be brazed using a type of joint design proposed in the pBPS and be representative for the intended production.

6.2 Shape and dimensions of test pieces

If not specified in an application standard, the shape and dimension of the test piece shall be agreed by the contracting parties.

The test piece is typically a basic lap or butt joint in sheet material or a sleeve joint in tube.

NOTE Examples of applicable joint configurations are given in Annex C.

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