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Welding for aerospace applications — Fusion welding of metallic components —

Part 1: Process specification

Soudage pour applications aérospatiales — Soudage par fusion des composants métalliques —

Partie 1: Spécification de processus

Reference number
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Foreword

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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).

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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 14, *Welding and brazing in aerospace*.

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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Welding for aerospace applications — Fusion welding of metallic components —

Part 1: Process specification

1 Scope

This document specifies the requirements for fusion welding of aerospace hardware. It is to be used in conjunction with the design/engineering authority's design documents or their accepted data.

This document covers the processes given in Table 1 and material groups given in Table 2.

Table 1 — Fusion welding processes covered by this document

Process	Process number (ISO 4063)
Oxyfuel welding	31
Gas-shielded arc welding with non-consumable tungsten electrode, Gas tungsten arc welding	14
Plasma arc welding	15
Electron beam welding	51
Laser welding, Laser beam welding	52

Table 2 — Material groups covered by this document (see ISO 24394:2018, 4.5)

Material group	Description
A	Unalloyed steel, low-alloyed steels, high-alloyed ferritic steels
B	Austenitic, martensitic and precipitation hardening steels
C	Titanium and titanium alloys, niobium, zirconium and other reactive metals
D	Aluminium and magnesium alloys
E	Materials that do not conform to other material groups (e.g. molybdenum, tungsten, copper alloys)
F	Nickel alloys, cobalt alloys.

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 3452 (all parts), *Non-destructive testing — Penetrant testing*

ISO 4063, *Welding and allied processes — Nomenclature of processes and reference numbers*

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

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

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

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ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508 (all parts), *Metallic materials — Rockwell hardness test*

ISO 6892 (all parts), *Metallic materials — Tensile testing*

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

ISO 10863, *Non-destructive testing of welds — Ultrasonic testing — Use of time-of-flight diffraction technique (TOFD)*

ISO 13588, *Non-destructive testing of welds — Ultrasonic testing — Use of automated phased array technology*

ISO 17636 (all parts), *Non-destructive testing of welds — Radiographic testing*

ISO 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO 17927-2[1)], *Welding for aerospace applications — Fusion welding of metallic components — Part 2: Acceptance criteria*

ISO 19828, *Welding for aerospace applications — Visual inspection of welds*

ISO 24394, *Welding for aerospace applications — Qualification test for welders and welding operators — Fusion welding of metallic components*

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

EN 4179, *Aerospace series — Qualification and approval of personnel for non-destructive testing*

ASTM E8/E8M, *Test Methods for Tension Testing of Metallic Materials*

ASTM E18, *Test Methods for Rockwell Hardness of Metallic Materials*

ASTM E21, *Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials*

ASTM E384, *Standard Test Method for Microindentation Hardness of Materials*

ASTM E1417/E1417M, *Standard Practice for Liquid Penetrant Testing*

ASTM E1742/E1742M, *Standard Practice for Radiographic Examination*

ASTM E1444/E1444M, *Standard Practice for Magnetic Particle Testing*

SAE AMS 2644, *Inspection Material, Penetrant*

SAE AMS-STD-2154, *Inspection, Ultrasonic, Wrought Metals, Process for*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901-1 and the following apply.

ISO and IEC maintain terminological 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/

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