An American National Standard

Specification for Fusion Welding for Aerospace Applications

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Specification for Fusion Welding for Aerospace Applications

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Prepared by the
American Welding Society (AWS) D17 Committee on Welding in the Aircraft and Aerospace Industries

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification provides the general welding requirements for welding aircraft and space hardware. It includes but is not limited to the fusion welding of aluminum-based, nickel-based, iron-based, cobalt-based, magnesium-based, and titanium-based alloys using electric arc and high energy beam processes. There are requirements for welding design, personnel and procedure qualification, inspection, and acceptance criteria for aerospace, support and non-flight hardware. Additional requirements cover repair welding of existing hardware. A commentary for the specification is included.

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Specification for Fusion Welding of Aerospace Applications

1. Scope and General Requirements

1.1 Scope. This specification contains requirements for fusion welding of aerospace hardware. It is to be used in conjunction with the Engineering Authority's design handbooks or their accepted data. When conformance to this specification is stipulated in contract documents, all provisions of this specification shall be complied with, except for those provisions that the Engineering Authority or contract documents specifically exempt, or those optional provisions that shall be applied when specified by the contract documents.

The following is a summary of the specification Clauses:

Clause 1. **Scope and General Requirements**: basic information on the scope and provisions of this specification.

Clause 2. **Normative References**: a listing of the documents that are required for the application of this specification.

Clause 3. **Terms and Definitions:** a list of technical terms and definitions of particular importance to this specification.

Clause 4. **Design of Welded Connections**: requirements and guidance information for the design of welded connections.

Clause 5. **Welding Performance and Procedure Qualification**: qualification requirements for welders, welding operators and welding procedures.

Clause 6. **Fabrication**: requirements for preparation, assembly and workmanship when welding aerospace hardware.

Clause 7. **Inspection**: criteria for inspector qualification, responsibilities of inspectors, acceptance of production welds, and standard requirements for performing visual inspection and nondestructive examination (NDE).

Clause 8. **Repair of Existing Structures**: requirements for repair of existing aerospace hardware.

Clause 9. **Welding of Nonflight Hardware**: requirements for welding nonflight hardware.

1.1.1 Flight Hardware. The fundamental premise of this specification is to provide general requirements for currently recognized aerospace fusion welding processes and materials. However, this specification provides for the application of new materials, new welding processes, or acceptance criteria for production welds differing from those defined in this specification. These new applications shall be documented by the proposer and approved by the Engineering Authority.

1.1.1.1 Aircraft, Rotorcraft, and Engines Subject to FAA Regulation. When applying welding in the design, construction and repair of aircraft, rotorcraft or engines subject to FAA regulation, the Engineering Authority must perform the appropriate design analyses and impose process control measures that will ensure compliance with the applicable requirements of the Code of Federal Regulations, Title 14.

1.1.2 Nonflight Hardware. Nonflight hardware, tooling, ground support equipment and related nonconventional aerospace facilities shall be designed and welded in accordance with the requirements of Clause 9.

1.2 Classification. All welds produced in accordance with this specification shall be classified on the engineering drawings. Weld classifications shall be as follows: Class A, Class B, or Class C. These classifications refer to the level of inspection required and to the acceptance criteria. Alternate acceptance criteria and inspection methods may be applied if specified on the engineering drawing. The Engineering Authority shall also determine the weld procedure qualification requirements (see Annex G—Commentary).