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Specification for Fusion Welding for Aerospace Applications



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**Specification for Fusion Welding
for Aerospace Applications**

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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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Table of Contents

	Page No.
<i>Personnel (Amendment)</i>	v
<i>Personnel (Original)</i>	vii
<i>Foreword</i>	ix
<i>List of Tables</i>	xv
<i>List of Figures</i>	xv
1. Scope and General Requirements	1
1.1 Scope	1
1.2 Classification	1
1.3 Approval	2
1.4 Mandatory Provisions and Authority	2
1.5 Standard Units of Measure	2
1.6 Safety and Health	2
2. Normative References	2
2.1 Government Documents	2
2.2 Nongovernment Documents	3
3. Terms and Definitions	4
4. Design of Welded Connections	6
4.1 Scope	6
4.2 Weldment Design Data	6
4.3 General Drawing Requirements	6
5. Welding Performance and Procedure Qualification	7
5.1 General Description	7
5.2 General Requirements (Performance)	7
5.3 Detailed Requirements (Performance)	8
5.4 Welding Procedure Qualification (Procedure)	22
6. Fabrication	24
6.1 Scope	24
6.2 Welding Consumables	24
6.3 Welding Equipment	27
6.4 Weld Settings	27
6.5 Preweld Cleaning and Other Preparation	27
6.6 Preweld Joint Preparation and Fit-up	27
6.7 Preheating and Interpass Temperature Control	28
6.8 Tack Welds	28
6.9 Weld Start and Run-Off Tabs	28
6.10 Weld Shielding for GTAW, GMAW, and PAW	28
6.11 Tungsten Electrodes	28
6.12 Filler Materials	29
6.13 Interpass Cleaning	29
6.14 Welding and Weldments	29
6.15 Postweld Cleaning	31
6.16 Postweld Processing	31

6.17	Weld Identification Requirements	31
6.18	Acceptance Inspection	31
6.19	Rework	31
6.20	Repair	32
6.21	Record Requirements	32
7.	Inspection	32
7.1	Qualification of Inspection Personnel	32
7.2	Vision Test	32
7.3	Visual Weld Inspection	32
7.4	Nondestructive Inspection	32
7.5	Acceptance Criteria	33
7.6	Inspection Records	37
8.	Repair of Existing Structures	37
8.1	Scope	37
8.2	Design	38
8.3	Welding Procedures	38
8.4	Welder and Welding Operator Qualification	39
8.5	Welding Equipment	39
8.6	Weld Repair Inspection	39
8.7	Grounding	39
8.8	Repair Documentation	39
9.	Nonflight Hardware	39
9.1	Scope	39
9.2	Exceptions and Additional Requirements	39
	Annex A (Normative) — Guidelines for Design, Analysis, and Fabrication of Weld Joints	45
	Annex B (Normative) — Effective Throat	59
	<u>Annex C (Normative) — Bend Testing Criteria</u>	61
	<u>Annex D (Informative) — Informative References</u>	69
	Annex E (Informative) — Safe Practices	71
	Annex F (Informative) — Guidelines for the Preparation of Technical Inquiries	75
	Annex G (Informative) — Commentary	77

List of Tables

Table	Page No.
5.1	Fusion Welding Processes. 8
5.2	Samples of Alloys Contained in Material Groups I through VIII. 10
5.3	Welding Position, Base Metal Form and Base Metal Qualified by Test Weld. 12
5.4	Other Welding Conditions Qualified by Test Weld 17
<u>5.5</u>	<u>PQR Test Requirements</u> 24
6.1	Gas Requirements 26
6.2	Recommended Shielding Gases for Welding 26
6.3	Preheat and Interpass Temperatures 29
6.4	Filler Metal for Welding Aluminum Alloys Using GMAW, GTAW, and PAW Processes. 29
6.5	Filler Metal for Welding Titanium Alloys Using GMAW, GTAW, and PAW Processes 29
6.6	Filler Metal for Welding Stainless Steels and Heat Resistant Alloys Using GMAW, GTAW, and PAW Processes. 30
7.1	Acceptance Criteria (in [mm]) 33
9.1	Industrial Codes and Specifications Suggested for Welding Aerospace Nonflight Hardware 40
A.1	Equivalent Fillet Weld Leg Size for Skewed T-Joints 58
C.1	Base Metals for Which Bend Testing is Not Applicable 62
C.2	Bend Specimen Thickness and Bend Radius (in) 63
C.2M	Bend Specimen Thickness and Bend Radius (mm) 64
C.3	Bend Specimens for Groove Welds in Tube. 65

List of Figures

Figure	Page No.
<u>5.1</u>	<u>Suggested Test Record Form</u> 9
5.2	Groove Weld in Sheet: Positions 1G, 2G, 3G, and 4G. 13
5.3	Fillet Weld in Sheet: Position 1F, 2F, 3F, and 4F. 14
5.4	Groove Weld in Tube Positions 1G, 2G, 5G, and 6G. 15
5.5	Fillet Weld in Tube: Positions 1F, 2F, 4F, and 5F 16
5.6	Groove Test Weld in Sheet 17
5.7	Fillet Test Weld in Sheet. 18
5.8	Groove Test Weld in Tube 19
5.9	Fillet Test Weld in Tube 19
5.10	Blank Locations for Metallographic Specimens in Fillet-Welded Sheet 20
5.11	Blank Locations for Metallographic Specimens in Fillet-Welded Tube. 20
5.12A	Incomplete Fusion at Root in Fillet Welds When Thickness of Both Members is Greater Than 0.063 in [1.6 mm] 21
5.12B	Incomplete Fusion at Root in Fillet Welds When Thickness of Any Member is Less Than or Equal to 0.063 in [1.6 mm]. 21
5.13	Welding Procedure Specification (WPS) Form 23
<u>5.14</u>	<u>Procedure Qualification Record (PQR) Form</u> 25
6.1	Joint Preparation in Joint Members of Unequal Thickness. 28
7.1	Acceptable and Unacceptable Weld Profiles 36
7.2	Mismatch Between Joint Members After Welding. 37
A.1(a)	Square Groove Butt Joints. 46

A.1(b)	Single-Bevel-Groove Weld Joints	47
A.1(c)	Single-V-Groove Weld Joints	48
A.1(d)	Single-J-Groove Weld Joints	49
A.1(e)	Single-U-Groove Weld Joints	50
A.1(f)	Double-Bevel-Groove Weld Joints	51
A.1(g)	Double-V-Groove Weld Joints	52
A.1(h)	Double-J-Groove Weld Joints	53
A.1(i)	Double-U-Groove Weld Joints	54
A.2	Two- and Three-Piece T-Weld Joints – Melt-through Welds	55
A.3(a)	Flanged Joints	55
A.3(b)	Flanged Edge Joints (Nonstandard)	56
A.4	Fillet Weld Details	57
B.1	Effective Throat	59
C.1	<u>Bend Specimens in Groove Welded Tube</u>	67

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).