The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS7110/5

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Submitted for recognition as an American National Standard

NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR FUSION WELDING

1. SCOPE

This Aerospace Standard (AS) is to be sued to supplement AS7110. In addition to the requirements contained in AS7110, the requirements contained herein shall apply to suppliers seeking NADCAP accreditation for fusion welding.

2. REFERENCES

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15086-0001.

AS7110 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Welding

3. REFERENCE REQUIREMENTS

3.1 Applicable customer specifications shall be available at the facility.

4. MATERIALS/MATERIAL CONTROL

4.1 There shall be a documented filler metal control system that addresses the following:

4.1.1 Ordering

a. Purchasing instructions shall specify wire specification, size and identification requirements.
b. Low hydrogen electrodes shall be procured in hermetically sealed containers.
c. Titanium wire shall be procured in argon purged and sealed containers or it shall be stored and cleaned with provisions in place to assure the absence of contamination.

4.1.2 Receiving

a. Chemistry certs shall accompany the weld filler metal.
b. The filler metal chemistry shall meet the specification requirements.
c. The marking on bare welding wire or rod shall comply with the requirements of applicable customer specifications, or other methods acceptable to the cognizant engineering organization.
d. Filler metal containers shall be stamped with material release stamp or other positive identification prior to placing material in storage crib.
e. Receiving inspection tests shall be performed as specified.

4.1.3 Storage

a. After low hydrogen electrodes are removed from hermetically sealed containers, they shall be stored in an oven at a temperature to prevent moisture contamination.
b. Bare wire and rod shall be stored in a clean, dry environment.
c. If used, SAW flux shall be stored in a clean, dry environment.
d. Filler metal shall be segregated by specification number in the storage crib in such a manner to prevent commingling of different filler metal specification numbers.
e. Access to storage crib shall be limited to authorized personnel.

4.1.4 Release to Shop

a. If requisition cards are used to remove filler metal from storage, they shall be filled out properly.
b. The crib attendant shall verify that the wire being released from storage match the type required for the job.

4.1.5 Control in Shop

a. The exposure of low hydrogen electrodes after removal from containers or ovens shall be suitably limited based on electrode classification.
b. There shall be only one type (chemical composition) of filler metal in weld booth.
c. If filler metal identification markings are lost, missing, or destroyed, the material shall be scrapped.
d. Wipe tests shall be performed in shop prior to using filler material (cut length wire).
e. After welding, filler metal stubs shall be discarded according to disposal procedures.

4.1.6 Identification

a. Each covered electrode shall have a distinguishable color code, type designation, or classification number marking.
b. Filler metal and flux shall be properly identified.
c. Each spool or coil of bare welding wire or rod shall carry an identifying label or mark.
d. The heat and lot number shall be marked on the filler metal container.
e. The control system shall prevent the mixing of filler material heat numbers.
f. Filler metal identification charts shall be clearly posted in the shop.

4.1.7 Traceability

a. If required, the heat number of the filler material shall be traceable to the component that was welded with that filler material.

4.1.8 Record Retention

a. The chemistry certs shall be maintained in an accessible filing system for the specified time.

4.2 Gases

4.2.1 Only the gases listed in Table 1 shall be used.

4.2.2 If alternate specification gases are used, there shall be written authorization from the customer.

TABLE 1 - Gases
(minimum requirements)

Gases	Specifications	Alternate Specifications
Argon	MIL-A-18455	CGA G-11.1
Helium	BB-H-1168	CGA G-9.1
Oxygen	BB-O-925, Type I or II	CGA G-4.3
Nitrogen	BB-N-411, Type I or II, Class 1, Grade B	CGA G-10.1
Hydrogen	BB-H-886, Type I or II	CGA G-5.3
Acetylene	BB-A-106, Grade B	CGA G-1.1
Carbon Dioxide	BB-C-101, Grade B	CGA G-6.2
Gas Mixtures	The purity of the gases in the mixture shall be as specified for the individual gases listed above.	

4.3 The shop shall have a procedure to monitor dew point and they shall follow it.

5. EQUIPMENT CONTROL

5.1 Welding equipment shall be capable of making satisfactory welds when operated by a qualified welder or welding operator as required.

5.2 Equipment shall be qualified in accordance with applicable customer specifications if required.

5.3 Cooling furnaces shall be provided with suitable means for controlling the cooling rate.

5.3.1 Furnace control temperature tolerances shall be within ± 25 °F (14 °C), unless otherwise specified.

6. QUALIFICATION OF WELD PROCEDURES/SCHEDULES

6.1 Welding procedures/schedules shall be qualified in accordance with applicable customer specifications.

6.2 Weld procedures/schedules shall identify those parameters specified by appropriate customer specification(s).

6.3 Preheat and interpass temperatures shall be included in the qualified schedule/procedure.

6.4 Filler metal requirements shall be specified on drawings or weld procedures/schedules.

6.5 When used, weld starts and run-off tabs shall be composed of the same alloy as the detail parts and welded with the same filler metal as required by the part.

6.6 When required, stress relief of weldments shall be performed in accordance with welding procedure or drawing.

7. PROCESS CONTROL

7.1 Fixtures, backing materials, and hold-down bars shall be kept clean and free from contaminants during use.

7.2 Joint designs and dimensions shall be as specified on drawings or welding procedure.

7.3 If required, surface finish requirements of fusion faces shall be specified on drawings or in the welding procedure.

7.4 Fusion faces shall be free of cracks, lamination, or burrs.

7.5 All faying surfaces shall be free from slag, visible surface oxides, scale, protective finishes, oils, grease, dirt, or other foreign materials.

7.6 If pre-weld joint fit-up is not specified on drawings or welding procedures, the fit-up shall be in accordance with other standards acceptable to the cognizant engineering organization or customer requirements.

7.7 Welders and welding operators shall identify their work by interim marking adjacent to the weld joint or by marking a sign-off sheet.