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

AEROSPACE STANDARD

SAE AS7110/4

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Submitted for recognition as an American National Standard

NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR SPOT, SEAM RESISTANCE, AND PROJECTION WELDING

1. SCOPE

This Aerospace Standard (AS) is to be used to supplement AS7110. In addition to the requirements contained in AS7110, the requirements contained herein shall apply to suppliers seeking NADCAP accreditation for spot, seam, resistance, and projection 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 AND MATERIAL CONTROL

4.1 When welding aluminum and magnesium alloys, the following information shall apply:

a. The ability of the facility's cleaning process shall be adequately demonstrated. (Such demonstration may be part of a Certification Weld Schedule.)

4.1 Continued

b. Conformity of materials surface condition shall be checked by surface resistance readings.
c. The contractor shall demonstrate that no deterioration of surface condition takes place, under typical holding and storage conditions, during the time allowed between parts cleaning and welding.
d. Mating parts shall be designed and processed so that prior to welding parts shall be in contact or can be made to be in contact with manual pressure.
e. One or more surface resistance indicators shall be available for checking the effectiveness of cleaning.

5. EQUIPMENT AND EQUIPMENT CONTROL

5.1 The welding equipment shall consist of a suitable source of electrical energy, means of adequately cooling the electrodes, and a means of adequately controlling and indicating the current.

5.2 The equipment shall be capable of controlling the welding force, and the time of current flow.

5.3 Electrode materials and shapes shall be suitable for performance of work according to specifications.

5.4 The supplier shall have shear testing machines.

5.5 The shear testing machines shall be accurate within ± 2% of the indicated reading or as specified by applicable customer specifications.

5.6 Portable spot weld shear test machines shall be checked for accuracy at intervals not to exceed 2 months.

5.7 All tooling or fixturing that passes through the magnetic field during the welding operation shall be made of non-magnetic materials as far as possible.

5.8 Jigs and fixtures shall be so designed so that no welding current can shunt through them instead of passing through the work pieces.

5.9 Each item of equipment shall be inspected periodically as recommended by the preventative maintenance plan.

5.10 Adequate preventative maintenance shall be performed.

5.11 Defective equipment parts affecting machine operation shall be replaced before production welding is resumed.

6. QUALIFICATION OF WELDING MACHINES

6.1 The equipment shall be qualified in accordance with applicable customer specifications.

6.2 Each type of machine in the facility shall be qualified and approved for use by supplier's Quality Assurance Department unless otherwise specified.

6.3 Weld conditions shall be documented on Machine Qualification Test Reports or equivalent.

6.4 Machine Qualification Test Reports, or equivalent, shall be posted near each machine so as to be available to machine operators, inspectors, and customer representatives.

6.5 Machines shall be qualified for the material type and thickness for which it is intended to be used in production.

6.6 Welding machines shall be requalified if rebuilt or if significant operational changes are made.

7. QUALIFICATION OF WELD PROCEDURE/SCHEDULE

7.1 Weld procedures/schedules shall identify those parameters specified by appropriate customer specifications.

7.2 Tests shall be conducted for the purpose of weld schedule/procedure qualification.

7.3 The results of these tests shall be documented in completed Qualification Test Reports.

7.4 Qualification Test Reports shall be available to customer representatives.

7.5 There shall be a Qualification Test Report for each machine and each combination of relevant material conditions, surface conditions, electrode configurations, and thickness combinations.

7.6 Each Qualification Test Report shall indicate effective weld machine settings, and a set of conditions and parameters for test and production welds.

7.7 Each Qualification Test Report shall indicate shear strength data on each weld, the average, the number of specimens with shear values outside set limits, and the nugget diameters or each metallographic specimen as required.

7.8 The Qualification Test Report shall indicate the success or failure to meet certification criteria.

7.9 The Qualification Test Reports shall be relevant to production welds.

7.10 Qualification tests shall be conducted in accordance with applicable customer specification.

8. PROCESS CONTROL

8.1 Capable personnel shall be responsible for machine settings and all welding schedules.

8.2 Qualified schedules shall be readily accessible and available for review at any time.

8.3 Welds shall be located as indicated on engineering drawings or other applicable documents.

8.4 Edge distance shall be such that there is no deformation or bulging at the edge of the sheet.

8.5 Location devices shall be used whenever necessary to locate welds.

8.6 All test specimens, except qualification specimens, shall conform to the production parts they represent with respect to material, thickness combination, and surface condition or preparation.

8.7 A daily check of surface resistance shall be made for aluminum and magnesium alloys.

8.8 If welding can not be maintained within the permitted schedule latitude adjustment, welding shall be stopped and the machine checked for faulty operation.

8.9 Results of production witness welds shall be maintained in a register near the welding machine, if required.

8.10 Test specimens for production parts shall be identified and performed in accordance with customer specification.