



400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

Submitted for recognition as an American National Standard

SAE AS7110/2

Rev
A

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NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR FLASH 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 flash welding.

2. REFERENCES

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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 Base materials shall be as specified in applicable part drawings.

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SAE AS7110/2 Revision A**5. EQUIPMENT CONTROL**

- 5.1 The flash welding equipment shall be capable of consistently producing welds which meet customer specifications.
- 5.2 Equipment shall be qualified in accordance with applicable customer specifications if required.
- 5.3 The equipment shall be automatically controlled with respect to the following:
 - a. Rate and distance of travel of the sections to be welded.
 - b. The equipment shall be automatically controlled with respect to controlling the secondary voltage and current magnitudes and timing.
- 5.4 The equipment shall be automated so that manually controlled flashing does not exceed 15% of total flashing travel.
- 5.5 All controls, meters, timers, and recorders used to regulate welding parameters shall adequately permit control of essential process variables.
- 5.6 Controls and instrumentation shall be calibrated at a frequency that will assure consistent performance.
- 5.7 Electrodes shall be of adequate size.
- 5.8 Electrodes shall be fitted to the parts to be welded so that the necessary current will be uniformly distributed about the contact zone, and shall be conducted from the electrode to the work without damage due to localized overheating.
- 5.9 When required, the equipment shall be set up by operators under the supervision of a welding engineer or other authorized personnel.

6. PERIODIC MAINTENANCE

- 6.1 Written procedures shall require preventive maintenance equipment and tooling at a specified frequency by qualified personnel (employees or vendors) in accordance with customer specifications.
- 6.2 Records shall indicate that maintenance is performed on equipment and tooling in accordance with the procedures and appropriate standards.

SAE AS7110/2 Revision A**7. QUALIFICATION OF WELD PROCEDURE**

7.1 Complete flash welding procedure schedules shall be established and approved before the machine is used for production welding.

7.2 Weld procedures/schedules shall identify those parameters specified by the applicable customer specification including:

- a. Preparation of parts to be welded
- b. Choice of tooling/dies/fittings
- c. Appropriate machine control devices and settings
- d. Proper sequence of events

7.3 Welding procedures/schedules shall be established on a part by part basis for each welding machine over appropriate range of cross-sectional areas.

7.4 Where sensors are used to monitor the welding process, these sensors shall be in operation during the establishment of welding procedures.

7.5 Charts and electronically stored data shall be retained for future examination.

8. PROCESS CONTROL**8.1 General Requirements**

8.1.1 A sufficient amount of extruded or upset metal shall be removed from all weld areas in order that no defective or unsound metal remains.

8.1.2 Welds shall be rejected if it is necessary to machine below the level of the surface of the parent metal to remove surface defects unless as allowed by customer specifications.

8.1.3 When gas is used, it shall be in accordance with customer requirements.

8.1.4 The surfaces of the parts contacting the electrodes and the surfaces at the fusion zones shall be clean and free from oxides, paint, grease, dirt, or foreign matter which would interfere with the flow of current or fusion of the metal.

8.1.5 If sand or grit blasting is used, the surfaces shall be treated to remove imbedded particles prior to welding.

SAE AS7110/2 Revision A**8.2 Detailed Requirements**

- 8.2.1** Mating parts shall be aligned in such a manner that heat generated by the flow of current is uniformly distributed over the section.
- 8.2.2** If tubing possessing a ratio of outside diameter to wall thickness is greater than 30:1 is welded, the equipment shall be capable of meeting alignment tolerances specified in applicable specifications.
- 8.2.3** Flash welded joints shall be evaluated in accordance with customer requirements.
- 8.2.4** Alignment tolerances shall be maintained within the limits of customer requirements.
- 8.2.5** Angular misalignment shall be within the limits of customer requirements.

9. INSPECTION AND ACCEPTANCE CRITERIA

- 9.1** All specimens used for checking production flash welding shall be made using established weld schedule.
- 9.2** Set-up shall be checked by welding and destructively testing three parts, or simulated production parts, each time a machine is set up according to a qualified welding procedure.
- 9.3** Proof testing samples shall be taken at customer specified frequency.
- 9.4** Each flash welded joint shall be visually inspected in accordance with customer requirements.
- 9.5** After proof testing, NDT shall be performed, when required.
- 9.6** Proof tests, destructive tests, and the results shall meet the requirements of the customer.
- 9.7** Records shall be kept of tests and a list of all parts corresponding to each set-up test shall be maintained.
- 9.8** Records shall include all procedure data and other data stored permanently on charts and/or in electronic media.
- 9.9** Records shall be available for examination.