

Submitted for recognition as an American National Standard

**NATIONAL AEROSPACE AND DEFENSE CONTRACTORS
ACCREDITATION PROGRAM
REQUIREMENTS FOR LASER 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 laser 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 The surfaces of parts to be welded shall be free from objectionable films such as heavy oxides, scale, ink, grease, dirt, or other substances or surface conditions detrimental to the welding processes.

5. EQUIPMENT CONTROL

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

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- 5.2 Equipment shall be qualified in accordance with applicable customer specifications if required.
6. QUALIFICATION OF OPERATORS/EQUIPMENT/PROCEDURE/SCHEDULE
- 6.1 Welding procedure qualification records shall be maintained in accordance with applicable customer specifications.
- 6.2 Operators shall be qualified on each type of equipment they operate to customer specification requirements and test records/results shall be available for each operator.
- 6.3 Laser equipment qualification shall be performed to customer requirements.
- 6.4 Qualification records/results shall be available for each laser machine.
- 6.5 Operators shall have yearly eye exams to verify corrected vision of 20/20.
7. PROCESS CONTROL
- 7.1 The supplier shall have a quality plan that defines method and accountability for all applicable blueprint requirements.
- 7.2 The router shall list the sequence of operations that document manufacturing, acceptance, and process operations.
- 7.3 There shall be detailed operation sheets per part number with parameter settings (laser schedule).
- 7.4 The operation sheet(s) shall be available to the laser operator at appropriate work station.
- 7.5 There shall be a procedure or process instruction in place containing at a minimum, details on the frequency and method of checking the following:
- a. Laser equipment
 - b. Gages
 - c. Dimensional requirements of the process
 - d. Laser safety
 - e. Laser welding procedures
 - f. A paragraph which states the laboratory analysis and its frequency to prove continuing conformance to engineering limits
- 7.6 Laboratory reports shall be traceable to parameter settings on operation sheets (laser schedule).

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- 7.7 Laboratory analysis reports shall be documented and held on file for customer review as proof of conformance that welded parts are within engineering limits.
- 7.8 Meters and gages shall be calibrated and marked with calibrating stickers. If calibration is not required, it shall be so identified.

8. OPERATING PROCEDURES

- 8.1 Operation sheets shall be used to instruct the operator.
- 8.2 Weld sketches shall be used to describe the welding process.
- 8.3 Machine "settings" shall be available in procedure form.
- 8.4 Operators shall check their work prior to releasing the part to the next operation.
- 8.5 Each part shall be visually checked for conformance.
- 8.6 Procedures shall be legible and in good condition.
- 8.7 Instructions shall be understandable and logical.
- 8.8 Instructions shall included in procedures and are they available to operators.
- 8.9 Written procedures shall be available for rework and are records maintained.
- 8.10 All parts being welded shall fall into the weld classes the supplier and operators are approved for.

9. PROCESS TESTING/QUALIFICATION

- 9.1 Test parts of the same material, geometry, surface preparation, and heat treat condition shall be used for:
- Proving the process dimensional capability
 - Destructive test to verify metallographic integrity
 - Nondestructive as required by drawing

- 9.2 Welding conditions shall be qualified by test welding.

10. POWDER VERIFICATION

- 10.1 Chemical composition certification of conformance or equivalent shall be available.