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Superseding AS7110/1A

**NATIONAL AEROSPACE AND DEFENSE CONTRACTORS
ACCREDITATION PROGRAM
REQUIREMENTS FOR BRAZING (TORCH & INDUCTION)**

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 brazing (torch and/or induction).

2. REFERENCES

2.1 SAE Publications

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

3. REFERENCE REQUIREMENTS

3.1 Applicable customer specifications shall be available at the facility.

4. MATERIALS/MATERIAL CONTROL

4.1 There shall be written procedures to assure that filler metals meet the contract requirements.

4.2 There shall be written procedures to assure that fluxes meet the contract requirements and that they are suitable for their intended use.

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- 4.3 Written procedures shall identify filler metal-flux combinations when these are not specified in contractual documents.
- 4.4 There shall be a procedure to monitor and control the shelf-life of braze materials.
- 4.5 There shall be documented evidence that the procedure is being followed.

5. EQUIPMENT CONTROL

- 5.1 The brazing equipment shall be capable of producing brazed joints that meet specifications and customer requirements.
- 5.2 Automated equipment shall be qualified in accordance with the applicable customer specification, if required.

6. QUALIFICATION OF BRAZING PROCEDURES

- 6.1 Brazing procedures/schedules shall identify those parameters specified by applicable customer specifications.
- 6.2 Torch braze operators shall be able to demonstrate their ability to set-up neutral, reducing, and oxidizing flame.

7. PROCESS CONTROL

- 7.1 Preparation of Joints
 - 7.1.1 Mating surfaces and adjacent areas of all parts to be joined shall be thoroughly cleaned to remove all oil, grease, paint, dirt, or any other foreign substance.
 - 7.1.2 Burrs shall be removed to assure proper fit-up and flow of filler metal.
 - 7.1.3 Clearances between mating surfaces shall be in accordance with specification requirements.
 - 7.1.4 Non-self-fixturing parts shall be held in position by fixtures or clamps.
 - 7.1.5 Parts shall be adequately supported during brazing.

- 7.1.6 On closed assemblies, vent holes shall be located and drilled as specified.
- 7.1.7 For joints having one end inaccessible to visual inspection, filler metal shall be placed at the blind end when it is practical to do so.
- 7.1.8 If parts are tack welded and/or staked, the tacking or staking process shall be authorized by drawing or purchase order when required.
- 7.1.9 If parts are tack welded, the tack process shall be performed by qualified personnel, using qualified procedures, if required.

7.2 METHODS AND PROCEDURES

- 7.2.1 Parts joined by torch braze shall be preheated with a neutral or slightly reducing flame.
- 7.2.2 The braze joint shall be preheated uniformly.
- 7.2.3 Braze technique shall be adequate to assure that parts are not heated to a temperature higher than necessary to provide a satisfactory joint.
- 7.2.4 Filler metal shall be introduced into one end of the joint or in a groove provided for in one of the joint mating surfaces.
- 7.2.5 Adequate flow through shall be verified by evidence of braze filler on both sides of the joint if accessible.
- 7.2.6 Filler metal shall be used in compliance with contract specifications.
- 7.2.7 There shall only be one chemical composition of filler material at the work station.

7.3 Post Brazing Treatment

- 7.3.1 Flux shall be removed after brazing and cooling per customer requirements.
- 7.3.2 If required by the customer, a written procedure and test shall be used to determine that flux has been adequately removed.
- 7.3.3 If performed, post braze heat treatment shall be as specified by the customer.

7.3.4 There shall be a procedure to prevent the post brazing passivation of stainless steel parts.

7.3.5 After brazing parts shall be handled and cooled in a manner to assure joint integrity.

8. INSPECTION AND ACCEPTANCE CRITERIA

8.1 A random sample shall be selected from each lot in accordance with customer specifications, if permitted.

8.2 Dimensional checks shall be performed as required.

8.3 Visual and other nondestructive testing (NDT) inspection and test procedures shall be in accordance with applicable customer specifications.

8.4 Nonconforming assemblies shall be identified and segregated.

8.5 Inspection tools to measure dimensional features shall be available to the inspector.

8.6 Joint Quality

8.6.1 Joints shall meet the following specified quality requirements for:

- a. A uniform radius size.
- b. Surface porosity.
- c. Blisters.
- d. Residual flux on the brazed joint.
- e. Amount of braze flash on adjacent surfaces.
- f. Unmelted braze metal.
- g. Erosion.
- h. Lack of braze

8.6.2 Joints shall meet the following specified quality requirements for:

- a. A uniform radius size.
- b. Surface porosity.
- c. Blisters.
- d. Residual flux on the brazed joint.
- e. Amount of braze flash on adjacent surfaces.
- f. Unmelted braze metal.
- g. Erosion.
- h. Lack of braze
- i. Internal defects as defined in inspection criteria.

9. INDUCTION BRAZE (Sections 9, 10 and 11 apply if a NADCAP Heat Treat audit is not performed)

- 9.1 The braze procedure shall be certified or approved through conforming inspection/test results on representative parts/coupons.
 - 9.1.1 The braze procedure shall be approved by the appropriate supplier quality and technical resources.
 - 9.1.2 The braze procedure shall conform to the applicable part drawing and specification requirements.
 - 9.1.3 When required, there shall be evidence that the braze procedure has been approved by the prime customer.
 - 9.1.4 Induction braze personnel shall be qualified as required by the customer.
 - 9.1.5 Provisions for controlling the configuration of coils shall be established.
 - 9.1.6 When required, the appropriate gas shall be used to establish an inert atmosphere.