SAE Aerospace
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AEROSPACE STANDARD

AS7110/1	REV. D

Issued 1995-03
Revised 2003-12
Cancelled 2007-03

Superseding AS7110/1C

Nadcap
Requirements for Brazing (Torch and Induction)

RATIONALE

AS7003 at Revision C removed the requirement for AS standards. The Nadcap Weld Task Group have revised their checklists and per AS7003 have not re-written associated standards. The AS standards, therefore, require cancellation.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of March 2007. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index.

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Nadcap
Requirements for Brazing (Torch and 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:

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

AS7110 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.

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/PERSONNEL:

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.

6.3 When required, evidence of customer approval for the braze operator shall be provided.

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 Surface preparations shall be in accordance with customer requirements.

7.1.3 Clearances between mating surfaces shall be in accordance with customer 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.

7.1.9.1 If tack welding is performed, the supplier shall have adequate controls to prevent stray arcs, undercut and oxidation, as 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 within the brazer's immediate work zone at one time.

7.2.8 There shall be a procedure to monitor the control and disposal of filler metal stubs.

7.2.9 Components shall be free from any protective coatings, including anodizing and chemical conversion, prior to brazing.

7.2.9.1 Flux shall be mixed in accordance with manufacturers instructions.

7.2.9.2 When required by the customer, the maximum time between fluxing and brazing shall be specified.

7.2.9.3 Brazing shall be conducted using a neutral or slightly reducing flame.

7.2.9.4 Post-braze cleaning shall be performed in accordance with customer requirements.

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 suitable measures taken to prevent the post brazing passivation of stainless steel parts, when required by the customer.

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 If permitted, sampling shall be in accordance with customer specifications.

8.2 Dimensional checks shall be performed as required.

8.3 Metallographic, 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 individual responsible for inspection.

8.6 Joint Quality:

8.6.1 Joints shall meet the quality requirements, as applicable, for example:

a. A uniform fillet radius size.

b. Surface porosity.

c. Blisters.

d. Residual flux on the brazed joint.

e. Amount of braze flash on adjacent surfaces.

f. Un-melted braze metal.

g. Erosion.