SAE Aerospace
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AEROSPACE STANDARD

SAE AS7102/1A

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Superseded by PRI AC7102/1

National Aerospace and Defense Contractors Accreditation Program Requirements for Brazing

RATIONALE

AS7102/1A is being cancelled and superseded by PRI AC7102/1. The requirements in the document have not changed.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of July 2008 and has been superseded by AC7102/1. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index noting that it is superseded by AC7102/1.

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1. SCOPE:

1.1 This Aerospace Standard (AS) is to be used to supplement AS7102. In addition to the requirements contained in AS7102, the requirements contained herein shall apply to heat treaters seeking NADCAP accreditation for brazing

2. REFERENCES:

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-1000.

AS7001	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Description
AS7002	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Rules for Implementation
AS7003	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation
AS7102	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Heat Treating

3. QUALIFICATION:

3.1 The braze procedure shall be certified or approved through conforming inspection/test results on representative parts/coupons.

3.2 The braze procedure shall be approved by the appropriate supplier quality and technical resources.

3.3 The braze procedure shall conform to the applicable part drawing and specification requirements.

3.4 The prime customer approval of braze procedure shall be obtained when required.

3.5 The recertification/reapproval of the certified or approved procedure shall be done when there are changes in stopoff, brazing aids, chemical solvents, surface preparation or other chemical used as part of the certified or approved braze procedure.

4. MATERIAL CONTROL:

4.1 Raw Materials (braze filler metal, shims, gases, feltmetal, weld fillers, etc.)

4.1.1 There shall be a written procedure for storage and control (including shelf life) of braze filler metal, stopoff and binders, and braze aid materials.

4.1.2 The supplier shall review the certifications to be sure they meet specification requirements.

4.1.3 The supplier shall show evidence that they are checking the certifications.

4.1.4 The test reports shall be complete and conform to the specifications.

4.1.5 The supplier shall periodically test braze materials using an independent lab to corroborate certification data if required by the contract or customer.

4.1.6 The supplier shall have a procedure for conducting brazability test prior to release to the shop.

4.1.7 There shall be evidence that the supplier is following this procedure.

4.1.8 The material containers shall be traceable to a test report for the applicable lot.

4.2 Other Materials:

4.2.1 The supplier shall verify that the brazing/atmosphere composition and purity does not cause unwanted nitriding, carburizing, plating, decarburizing, or deleterious effects on the base material.

4.2.2 The supplier shall utilize blasting as a method of surface preparation if required.

4.2.3 The blast media shall be clean, uncontaminated, and used only for braze surface preparation.

4.2.4 The blast media shall be subject to periodic replacement by a documented process control plan.

4.2.5 It shall be verified that the blasting media will not deter the flow of the brazing alloy.

4.2.6 The supplier shall utilize plating as a method of surface preparation if required.

4.2.7 Plating solutions shall be subject to periodic evaluation by a documented process control plan.

4.2.8 The plating control plan shall control the plating thickness and location of the deposited plating material.

5. BRAZE FACILITIES:

5.1 Material Distribution and Control:

5.1.1 The gas purity shall be monitored where it enters the brazing chamber.

5.1.2 There shall be a controlled braze filler metal storage area in accordance with customer requirements where alloys are segregated and employee access is limited.

5.2 Assembly Area:

5.2.1 The area shall have the proper equipment to clean the parts by the approved procedures.

5.2.2 The area shall have welding and forming equipment that is in good working order.

5.2.3 The welding equipment shall be suitable to perform the processes involved.

5.2.4 There shall be suitable gaging to insure that the proper braze gaps are being maintained.

5.2.5 The assembly area shall provide adequate tooling/fixturing so that the proper braze gaps can be obtained.

5.2.6 The area shall exhibit satisfactory housekeeping to be able to maintain clean braze joints during and after assembly.

5.3 Braze Filler Metal Application Area:

5.3.1 The supplier shall have a separate braze filler metal application room so parts can be prepared in a clean environment.

5.3.2 The area shall be well lighted.

5.3.3 The braze filler metals at the individual workstations shall be properly identified.

5.3.4 There shall be a procedure for controlling the amount and placement of braze filler metal.

5.3.5 There shall be evidence that the procedures are being followed.

5.3.6 Once braze filler metal is applied, parts shall be protected from becoming dirty.

6. BRAZING EQUIPMENT:

6.1 For furnace brazing, all of the requirements of the heat treating portion of this specification shall be met.

6.2 There shall be a procedure for high temperature bake out of the brazing chamber.

6.3 For vacuum brazing, equipment shall obtain a vacuum level required by customer.

6.4 There shall be procedures/drawings to control the shape of the coil when induction brazing.

6.5 Material handling devices shall be available to ensure that parts can be loaded safely into the brazing equipment.

7. PROCESS SEQUENCE/OPERATION SHEETS/PROCEDURES:

7.1 Part Preparation:

7.1.1 Cleaning/surface preparation methods shall be as allowed by process specification or engineering drawing.

7.1.2 Parts shall be cleaned/blasted by the certified or approved braze procedure.

7.1.3 The delay time between cleaning/blasting and brazing shall conform to the braze procedure.

7.1.4 If aluminum oxide grit blasting or aluminum oxide grinding wheels have been used in preparing the part, special procedures shall be identified to remove all traces of the residue.

7.1.5 The cleaning process shall leave the braze surface such that the braze filler will flow readily.

7.1.6 The process planning shall insure that once the part has been cleaned, it will not be contaminated in later operations.

7.1.7 If required by the drawing, the part shall be plated.

7.1.8 Parts shall be plated by the certified braze procedure, drawing, or specification requirements.

7.1.9 If applicable, plating requirements, including all process parameters and setup procedures, shall be defined in a change control document.

7.1.10 The planning shall include the removal of all burrs that could inhibit braze flow.

7.1.11 If a vacuum cleaning process was used for surface preparation, the time/temperature cycle shall meet the requirements of the approved procedure.

7.2 Fitup/Assembly Process Planning:

7.2.1 Assembly methods shall be fully defined.

7.2.2 The assembly planning shall indicate the size of braze gap that is required.

7.2.3 The planning shall require that the braze gap be verified.

7.2.4 The fabrication process shall be controlled so that the desired braze gap is achieved.

7.2.5 The resultant dimensional changes from thermal treatment shall be considered in the planning.

7.2.6 The process planning shall verify that the proper braze gap was achieved during assembly.

7.2.7 The planning shall require that the assembled part be reworked if the proper braze gap is not achieved.

7.2.8 The supplier shall only use tack welding when permitted by the engineering drawing.

7.2.9 The location, sequence, and size of the tack welds shall be fully defined.

7.2.10 Controlled welding procedures shall be available for making the necessary fusion welds.

7.2.11 There shall be evidence that the procedures are being followed.

7.2.12 The supplier shall have qualified welders to assemble the braze hardware.

7.2.13 The planning shall include an operation to remove dirt, grease, oil, oxides, etc. from the part.

7.2.14 The parts shall be given a wipe check before assembly.

7.2.15 If parts do not pass the wipe check, they shall be reprocessed through the cleaning operation.

7.2.16 Cleaned parts shall be stored in a clean location.

7.2.17 All assembly fixturing shall position the parts in a stress free condition.

7.2.18 If assembly fixturing is used, it shall allow accessibility for the tack weld operation.

7.2.19 Every attempt shall be made to avoid the use of furnace assembly tooling.

7.2.20 If required, the furnace assembly tooling shall be simple and of the lowest mass possible.

7.2.21 The fixturing shall allow for thermocouple placement or access of the controlling pyrometer.

7.2.22 The tooling shall allow for base material thermal expansion differences.

7.2.23 The furnace fixture shall provide for maximum exposure to the part to the furnace heating elements.

7.2.24 The planning shall include a consideration of melting point eutectics being formed between the part and the fixture or the part and the furnace.

7.3 Braze Filler Metal Application:

7.3.1 The braze filler metal placement/assembly planning sheet shall contain the following:

a. Gap control requirements and what to do if they are not met
b. Cleaning instruction
c. Assembly instructions
d. Shimming material type and placement instructions, if allowed
e. Tacking instructions, if allowed
f. The type of braze filler metal
g. The form of braze filler metal
h. The location and amount of braze filler metal
i. The stopoff requirement including amount and location
j. Handling instructions
k. Process completion procedures
l. Inspection criteria

7.3.2 The materials specified on the certified procedure shall be allowed by drawing or customer approval.

7.3.3 The proper braze filler metal type, form, and amount shall be applied by the certified or approved brazing procedure.

7.3.4 The braze filler metal lot shall be entered on the router form and traceable to a braze filler metal certification.

7.3.5 Flux shall be used as required (type, amount) by the braze procedure/part drawing.

7.3.6 The proper stopoff shall be applied in the proper locations by the certified or approved braze procedure.

7.3.7 The proper aid (shim, feltmetal, etc.) shall be applied in the proper manner by the certified or approved braze procedure.

7.3.8 The braze filler metal placement/assembly planning sheets shall be signed off by the certifying source.

7.4 Braze Processing:

7.4.1 The braze part sequencing and procedure shall contain the following information:

a. Part positioning information
b. The maximum number of parts per load