SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS7109/6

REV. A

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Superseding AS7109/6

(R) Nadcap
Requirements for Plating of Coated Parts

1. SCOPE:

This SAE Aerospace Standard (AS) is to be used as a supplement to AS7109. In addition to the requirements contained in AS7109, the requirements contained herein shall apply to suppliers seeking Nadcap Coatings accreditation who are engaged in plating of coated parts. Demonstrated compliance (as described in AS7003) to AS7108 satisfies the requirements contained herein.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this standard to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Telephone: (724) 776-4841, Web address: http://www.sae.org.

AS7003	Nadcap - Program Operations
AS7108	Nadcap - Requirements for Chemical Processes
AS7109	Nadcap - Requirements for Coatings

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

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2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959, Telephone: (610) 832-9585, Web address: http://www.astm.org.

ASTM B 244	Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
ASTM B 487	Standard Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section
ASTM B 499	Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM B 504	Standard Test Method for Measurement of Thickness of Metallic Coatings by the Coulometric Method
ASTM B 530	Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method Electrodeposited Nickel Coatings on Magnetic and Nonmagnetic Substrates
ASTM B 567	Standard Test Method for Measurement of Coating Thickness by Beta Backscatter Measurements
ASTM B 568	Standard Test Method for Measurement of Coating Thickness by X-Ray Spectrometry

3. EQUIPMENT AND FACILITIES:

3.1 Tanks shall be free of evidence of leaking.

3.2 Tanks and work surfaces shall be maintained sufficiently free of corrosion and chemical spillage.

3.3 Spray and rinse tanks shall be clean, clear, free-running or monitored for contamination levels, and situated in a sequence to prevent cross contamination of process tanks to assure adequate neutralization and/or removal of process chemicals.

3.4 Process and rinse tanks shall be situated such that hardware can be maintained wet, from final cleaning and activation through the process to the final rinse, without interruption.

3.5 Tanks with temperature range requirements shall be equipped with controls and over- and under-temperature alarms.

3.6 Tanks shall have sufficient volume and dimensions to contain hardware during processing and assure sufficient coverage of parts.

3.7 There shall be sufficient agitation (without excessive bubbling in the work area) to ensure uniformity of temperature and solution concentration.

3.8 Tanks shall be constructed of nonreactive materials compatible with the process chemicals used and with the alloys of the hardware processed.

3.9 Fixtures, workbars, electrical connections, and hard masking shall be sufficiently free of corrosion, deposits and physical damage that interfere with proper installation or contact while in use.

3.10 Fixtures and masking shall be designed to prevent air or solution entrapment on parts to be processed that will affect processing.

3.11 Fixturing and racking design shall be adequate so that, when hardware is positioned for rinsing, there is adequate process solution neutralization and removal and it precludes process solution and rinse water drag-out and cross-contamination of process tanks.

3.12 Fixturing and rack design, and the arrangement of workbars and anodes, shall be such that electrical contacts are solid but preclude potential pressure damage or electrical arcing.

3.13 Tanks for electrodeposition of coatings shall be equipped with cathodes or anodes that can be reconfigured as needed, or conforming electrodes shall be used, for processing hardware with variable geometric configuration or for variable lot sizes to assure uniform deposition rates.

3.14 Tanks shall be properly labeled to include identification number and contents.

3.15 Tank walls, when appropriate, shall be electrically isolated.

3.16 There shall be an effective drying/filtering system in place to extract oil, water and other contaminants from compressed air lines.

3.17 Tanks shall be equipped with sufficient filtration to remove contamination and filters shall be changed at a predetermined frequency or otherwise controlled to remove contamination.

3.18 Power supplies shall be equipped with calibrated ammeters and voltmeters.

3.19 If power failure occurs, there shall be a mechanism that requires the operator to physically restart the power supply.

3.20 Rectifiers shall be uniquely identified to the tank which they service, or if not each tank shall have individual rheostat.

3.21 Timers:

3.21.1 Timers shall be available, suitable and accurate to the purpose, and visible from the tanks.

4. PART PROCESSING CONTROL:

4.1 There shall be a procedure to specify current density, voltage, amperage, time, bath composition and concentration, temperature and other significant process variables as applicable.

5. CLEANING PROCEDURES:

5.1 Cleaning procedures shall be compatible with part alloys, dissimilar components of assemblies, previously deposited coatings, and braze/solder joint material.

5.2 Hardware test specimens shall be processed through the cleaning procedures with the hardware if required by customer.

5.3 Hardware shall be visually inspected for embedded grit or contaminants when mechanical methods are used to clean or activate hardware surfaces.

5.4 Procedures shall provide for removal of grease, oils, dirt and other contaminants.

5.5 Parts shall be suitably protected against recontamination prior to subsequent processing.

5.6 Mechanical Cleaning:

5.6.1 Control procedures shall be in place to assure proper particle size distribution is maintained.

5.6.2 Control procedures shall be in place to prevent cross contamination of alloys during mechanical cleaning (e.g., aluminum and iron based alloys).

5.6.3 When abrasive blast techniques are used, off-set distances, times, pressures, and media shall be specified.

5.6.4 Roughness standards shall be used to verify surface finish, if required by customer or supplier.

5.6.5 Hardware shall be visually inspected and documented to verify corrosion, oxides, scale, and abrasive media have been removed.

5.6.6 Parts shall be suitably masked or protected to prevent attack of surfaces of the hardware that are not to be subsequently chemically processed.

5.6.7 Procedures shall be in place for masking prior to cleaning, for visual inspection of adequate masking before and after cleaning, and for remasking when masking is damaged during mechanical cleaning.

5.7 Chemical Cleaning:

5.7.1 Cathodic alkaline cleaning shall be prohibited with high strength steels over 180 ksi (1240 MPa), unless otherwise approved by customer.

5.7.2 Parts shall be maintained wet and visually inspected for water break free surface after the cleaning cycle.

5.7.3 Activation chemical baths shall be in line for processing part immediately prior to plating operations.

6. MASKING:

6.1 Work instructions shall specify areas to be masked.

6.2 Masking materials shall be specified on the work instructions.

6.3 Masking material shall be compatible with hardware and process conditions.

6.4 All traces of adhesives, masking material, markings, and residual chemicals shall be removed after processing and before further thermal processing or shipment.

6.5 Procedures shall be in place for masking prior to cleaning, for visual inspection of adequate masking before and after cleaning, and for remasking when masking is damaged during mechanical cleaning.

7. LOT INTEGRITY:

7.1 Procedures shall specify how lots and sub-lots of similar parts are to be identified to preclude mixing and ensure lot integrity.

7.2 Travelers or other documentation, both completed and in-process, shall demonstrate that lot integrity is maintained.

7.3 If required, test specimens shall accompany parts and be traceable to (sub)lots during cleaning, processing and any post-plating treatments.

8. HOUSEKEEPING MATERIAL CONTROL:

8.1 Reactive materials such as acids/alkalines or oxidizers/organics shall be segregated in storage.

8.2 Process materials shall be stored to preclude damage or degradation from heat, cold, water, atmospheric moisture or other environmental considerations.

8.3 Process materials that are transferred from original manufacturer's containers shall be labeled to maintain identity and controlled to prevent contamination or degredation.

8.4 Training or procedures shall address cleaning of pumps and other transfer equipment after use to preclude material contamination and ensure operator safety.

9. TEST AND INSPECTION:

9.1 The facility shall have equipment available to measure plating thickness/weight gain.

9.1.1 This equipment shall conform applicable national standards:

9.2 Procedures shall define calibration and inspection requirements for the specific thickness measurement being conducted, including base metal, coating composition, before use.

9.3 Procedures shall address the following factors which could affect reading accuracy, considered when measuring coating thickness.

a. Electrical and magnetic properties of the base metal and coating, including residual magnetism and stray magnetic currents.

b. Edge effect and abrupt changes in cross section.

c. Curvature of area being inspected.

d. Surface roughness.

e. Probe pressure and orientation.

f. Improper preparation.

g. Coating thickness.

h. Measurement time.

9.4 The measurements shall be recorded and their acceptability verified.

9.5 The equipment shall be inspected and verified for proper function and calibration.

9.6 Tests shall be conducted and documented for the following in accordance with customer requirement:

a. Surface appearance.

b. Adhesion.

10. PROCESS CONTROL LABORATORY PROCEDURES (SOLUTION ANALYSIS):

10.1 The following responsibilities shall be assigned and documented.

a. Review and approval of test results.

b. Authorization of Retests.

c. Calculation of process solution additions and corrections.

d. Preparation and approval of test procedures.

10.2 These responsibilities shall be performed by a qualified individual or by a technician supervised by such an individual.

10.3 There shall be a solution run chart which contains the following information for each tank monitored:

a. Tank identification.

b. Tank contents.

c. Tank size (working volume).

d. Operating temperature.

e. Analysis frequency.

f. Constituents to be analyzed (note major and minor).

g. Operating tolerances (temperature, constituents, pH, etc.).

h. Date sample was collected.

i. Analysis values.