SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS7109/6

Issued 1995-03

Submitted for recognition as an American National Standard

NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR PLATING OF COATED PARTS

1. SCOPE

This Aerospace Standard (AS) is to be used as a supplement to SAE 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 SAE AS7003) to SAE AS7108 satisfies the requirements contained herein.

2. REFERENCES

2.1 SAE Publications

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15086-0001.

AS7003 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation

AS7108 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Chemical Processes

AS7109 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Coatings

2.2 PRI Publications

Available from Performance Review Institute, 163 Thornhill Road, Warrendale, PA 15086-7527.

AC7109 NADCAP - Audit Criteria for Coatings

2.3 ASTM Publications

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 244 Measurement by Eddy-Current
ASTM B 487 Measurement by Metallographic Cross Section
ASTM B 499 Measurement by Magnetic Attraction or Magnetic Flux Reluctance
ASTM B 504 Measurement by Controlled Anodic Removal of Coatings
ASTM B 530 Measures Nickel Plate Thickness by Magnet Attraction or Magnet Flux Reluctance
ASTM B 567 Measures Coating Thickness by Beta Backscatter Measurements
ASTM B 568 Measures Intensity of Secondary Radiation from Coating

3. EQUIPMENT AND FACILITIES

3.1 Tanks shall be structurally sound with no 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 over- and under-temperature controls.

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

3.7 Tanks that require uniformity of temperature and solution concentration shall be agitated properly.

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 and physical damage while in use.

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

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 The supplier's tanks for electrodeposition of coatings shall comply with one of the following:

a. Tanks shall be equipped with cathodes or anodes that can be reconfigured as needed.
b. 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 The air supply shall be clean, dry, and filtered.

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

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

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

3.20 Timers

3.20.1 Timers shall be available, suitable to the purpose, calibrated to traceable standards, 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 coupons shall be processed as required through the cleaning procedures with the hardware.

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 and cross contamination of alloys during mechanical cleaning (e.g., aluminum and iron based alloys) is minimized.

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

5.6.3 Roughness standards shall be used to maintain surface finish, as required by customer or supplier.

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

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

5.6.6 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.

5.7.2 Parts shall be maintained wet and a water-break-free surface shall be observed 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 instruction planning shall specify areas to be masked.

6.2 Masking materials shall be specified in 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 If a power failure occurs, there shall be a mechanism that requires the operator to physically restart the power supply.

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 the procedures are followed.

8. HOUSEKEEPING

8.1 The company's facilities shall be clean, uncluttered, and well lighted.

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

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

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

8.5 Training or procedure 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 thickness measurement equipment available to measure plating/surface treatment thickness.

9.1.1 This equipment shall conform to:

a. ASTM B 244, Measurement by Eddy-Current
b. ASTM B 487, Measurement by Metallographic Cross Section
c. ASTM B 499, Measurement by Magnetic Attraction or Magnetic Flux Reluctance
d. ASTM B 504, Measurement by Controlled Anodic Removal of Coatings
e. ASTM B 530, Measures Nickel Plate Thickness by Magnet Attraction or Magnet Flux Reluctance
f. ASTM B 567, Measures Coating Thickness by Beta Backscatter Measurements
g. ASTM B 568, Measures Intensity of Secondary Radiation from Coating

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. Base metal thickness
c. Edge effect and abrupt changes in x-section
d. Curvature of area being inspected
e. Surface roughness
f. Probe pressure and orientation
g. Improper preparation
h. Coating thickness
i. Measurement time

9.3.1 These measurements shall be recorded.

9.3.2 The equipment shall be inspected for proper function and calibration.

9.3.3 Test shall be conducted and documented for the following in accordance with customer requirements:

a. Surface appearance
b. Adhesion