SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS7109/1

REV. A

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Superseding AS7109/1

(R) Nadcap Requirements for Thermal Spray

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 thermal spray.

1.1 The requirements for accreditation for the following classes are contained herein.

Class A - OXY/Fuel Powder Spray
Class B - Plasma Thermal Spray
Class C - HVOF
Class D - Low Pressure Plasma Spray (LPPS)
Class E - Electric Arc Wire Spray
Class F - Oxy/Fuel Wire Spray
Class G - D-GUN Spray

1.2 The requirements for accreditation for the following coating groups are contained herein:

High/low temperature
Anti fretting coatings
Thermal barrier coatings
Abrasive seal coatings
Abradable coatings
Dimensional build-up coatings
High temperature coatings (LPPS)

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.

AS7102	Nadcap - Requirements for Heat Treating
AS7109	Nadcap - Requirements for Coatings
AS7109/4	Nadcap - Requirements for Stripping
AS7109/7	Nadcap - Requirements for Heat Treating for Suppliers of Coatings

3. OPERATOR TRAINING AND CERTIFICATION:

3.1 All of the designated spray operators shall be currently certified (when required by the customer) or otherwise approved in accordance with supplier procedures.

3.2 All spray operators shall pass a practical spray test.

3.3 If the spray operator fails the spraying proficiency test, the source shall provide further training.

3.4 All designated spray operators shall be currently certified (when required by the customer) or otherwise approved in accordance with supplier procedures.

3.5 Operators shall be re-qualified every 24 months. (This can be done on production hardware.)

3.6 Records shall be approved and maintained for all active spray operators.

3.6.1 Records shall contain the following:

a. Operator initial qualification data.

b. Operator data forms.

c. Re-qualification test data.

d. All test results.

e. A list of coatings and spray methods that the operators have demonstrated.

4. PROCESS PLANNING:

4.1 Coating trials shall be conducted prior to initial production to ensure the coating will meet material/process specifications as applicable.

4.2 Coating trials shall meet all applicable customer requirements.

4.3 The supplier shall have approved technical plans for the coating of hardware as required by the customer.

5. MANUFACTURING:

5.1 The supplier shall have detailed work instructions describing each step in the coating of parts.

a. Preparation of coating materials before coating parts.

b. Methods of cleaning and/or preparing parts before coating.

c. Fixturing and Masking techniques.

d. Coating application procedures including process parameters and their limits.

e. Details of post coating thermal treatments.

f. Methods of protection against corrosion and damage in accordance with customer requirements.

5.2 The supplier shall have a method for the controlling the removal of nonconforming coatings. If removal of nonconforming coatings is performed on site or by a subcontractor, the source performing the removal shall be Nadcap accredited to AS7109/4.

6. MATERIAL POWDER/WIRE CONTROL:

6.1 The supplier shall have a powder/wire control system in place to confirm material certifications against purchase order requirements.

6.2 The powder/wire control shall demonstrate the following components:

a. Listing of approved powder/wire sources.

b. Acquisition of materials from approved sources.

c. Requirement for each powder/wire lot to be supplied with detailed chemistry and size certification.

d. Documentation shall provide evidence that each characteristic and size requirement has been verified.

e. Test data indicating sprayability shall be conducted on each lot of wire/powder as required by customer and/or defined by internal procedure.

f. New lots of powder/wire, pending approval, shall be physically segregated from released production material.

g. Production powders/wires shall be identified and stored in an appropriately controlled environment.

h. Material issued to/returned from production shall be properly identified and stored.

i. Procedure shall exist addressing drying and mixing requirements of production powders and their verification prior to use.

j. If material can be returned to inventory, it must be protected against contamination during production.

7. CLEANING:

7.1 The supplier shall have controls for maintaining concentrations and temperature for cleaning solutions as required and for monitoring their performance on a periodic basis.

7.2 There shall be provisions to avoid part contamination after cleaning.

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

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

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

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

7.7 Mechanical Cleaning:

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

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

7.7.3 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.

8. MASKING:

8.1 The parts shall be suitably masked to protect surfaces not to be coated.

8.2 Criteria for masking application shall be specified.

8.3 If used, hard masking tooling shall be controlled, and properly maintained.

8.4 Guidelines shall be established to ensure that the method of masking/trimming is not detrimental to the part.

9. GRIT BLASTING:

9.1 The supplier shall maintain and control grit blasting materials.

9.2 Filters shall be installed in the compressed air lines or system to extract oil and water.

9.3 Grit blasting shall be performed to an approved procedure.

9.4 The procedure shall define the following:

a. Grit size.

b. Grit type.

c. Operating pressure.

d. Operating distance/angle.

e. Uniform motion to achieve coverage (i.e., rotation/traverse).

f. Inspection for coverage, roughness, excessive surface removal.

g. Protection of parts after grit blast (e.g., use of gloves).

9.5 The grit used (in cabinets) shall be maintained to ensure compliance with specification requirements.

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

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

10. SPRAY BOOTHS (GRIT AND THERMAL SPRAY):

10.1 Spray booths shall be illuminated and ventilated.

10.2 Spray booth floors and walls shall be maintained to prevent contamination of part being processed.

10.3 Filters shall be installed in the compressed air lines to the spray equipment or system to extract oil and water.

11. OXY/FUEL:

11.1 Records shall support that maintenance has been performed by schedule and procedure.

11.2 Procedures and process controls shall be established for the following:

a. Torch configuration.

b. Operation parameters.

c. Material feed rate control.

d. Part/gun manipulation/control.

e. Accept/reject criteria.

f. Part temperature control.

g. Auxiliary cooling.

12. PLASMA THERMAL SPRAY:

12.1 Records shall support that maintenance has been performed by schedule and procedure.

12.2 Procedures and process controls shall be established for the following:

a. Torch configuration.

b. Operation parameters.

c. Material feed rate control.

d. Part/gun manipulation/control.

e. Accept/reject criteria.

f. Part temperature control.

g. Auxiliary cooling.

12.3 Torch electrodes and nozzles shall be examined periodically for erosion/damage.

12.4 There shall be established criteria for electrode and nozzle replacement.

12.5 Gas dew point requirements shall be established when required.

13. HVOF/D-GUN SYSTEMS:

13.1 Records shall support that maintenance has been performed by schedule and procedure.

13.2 Procedures and process controls shall be established for the following:

a. Torch configuration.

b. Operation parameters.

c. Material feed rate control.

d. Part/gun manipulation/control.

e. Accept/reject criteria.

f. Part temperature control.

g. Auxiliary cooling.

14. LOW PRESSURE PLASMA SPRAY (LPPS):

14.1 Records shall support that maintenance has been performed by schedule and procedure.

14.2 Procedures and process controls are established for the following:

a. Torch configuration.

b. Operation parameters.

c. Material feed rate control.

d. Part/gun manipulation/control.

e. Accept/reject criteria.

f. Part temperature control.

g. Visual monitoring of reverse transferred arc.

14.3 The supplier shall have procedures for qualifying the following:

a. Vacuum system integrity (leak rate).

b. Traceable calibration of vacuum instruments, records and sensors.