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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

AS7109/7

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Submitted for recognition as an American National Standard

NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR HEAT TREATING FOR SUPPLIERS OF COATINGS

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 heat treating during the coatings process. Demonstrated compliance (as described in SAE AS7003) to AS7102 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
AS7102	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Heat Treating
AS7109	National Aerospace Defense Contractors Accreditation Program (NADCAP) - Requirements for Coatings
AMS 2750	Pyrometry

2.2 PRI Publications

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

AC7109 NADCAP - Audit Criteria for Coatings

3. FURNACE CONTROL AND MAINTENANCE

3.1 Operating Instructions

3.1.1 Current operating manuals or instructions shall be available to furnace operators, maintenance personnel, and other personnel requiring the information.

3.2 Heating Times

3.2.1 Procedures shall specify the method for determining heat-up time or start of soaking time, and cooling rate.

3.2.2 Records on the furnace chart or log shall indicate that the procedures are followed.

3.2.3 When metal temperature is specified, records shall demonstrate that the metal was at temperature for the specified time.

3.3 Maintenance

3.3.1 Maintenance schedules shall be prepared for each furnace.

3.3.2 Records shall indicate that maintenance has been performed in accordance with the schedule.

4. FURNACE CONDITION

4.1 External Furnace Condition - For each furnace where practical:

4.1.1 The doors, fans, etc., shall be free of evidence of leaking atmosphere.

4.1.2 Safety interlocks, flame curtains, burn offs, and other safety items shall be operational.

4.1.3 Plumbing and other functional apparatus shall be clearly marked and/or color coded.

4.2 Internal Furnace Components - For each furnace where practical:

4.2.1 The composition and condition of the internal furnace components (e.g., refractory, metals, insulation, heating elements, and element insulators) prevent detrimental affects to the parts/material being heat treated.

5. CONTROL OF HEATING ENVIRONMENT

5.1 Procedures shall specify how each atmosphere is to be controlled.

5.2 Procedures shall specify how atmospheres are to be monitored.

5.3 Metering

5.3.1 Flowmeters shall be operational and appropriate for the gas and flow rates.

5.3.2 Maintenance schedules shall include periodic checks of floats in flowmeters to ensure that they are free and functioning.

5.4 Purging

5.4.1 When the atmosphere is changed, the furnace shall be purged in accordance with a written procedure (based on tests or good practice) that assures elimination of effects of the previous atmosphere.

5.4.2 There shall be a procedure to maintain inlet dew point of argon, helium, and hydrogen atmosphere when these gases are used for establishing the furnace atmosphere.

5.4.3 Records on the furnace chart or log shall indicate that the procedure is followed.

6. RACKING, FIXTURES, BASKETS, AND RETORTS

6.1 Procedures shall require that specially designed racks and fixtures are used for the specific parts as required.

6.2 Racks/fixtures/baskets/retorts shall be examined for integrity and repaired or scrapped as necessary.

7. PYROMETRY TESTING

7.1 Temperature Uniformity Tests

7.1.1 The procedure and frequency of tests shall conform to AMS 2750 unless other applicable specifications require a more frequent testing.

7.1.2 Readings shall be taken as the temperature approaches the test range frequently enough to detect when the first test or working sensor reaches the minimum.

7.1.3 After the temperatures have stabilized or exhibited a recurrent pattern, readings shall be taken in accordance with the following:

a. At a frequency sufficient to identify the extremes of any recurrent pattern
b. For 30 minutes or five cycles of the recurrent pattern, whichever is greater

7.1.4 The recurrent temperature pattern shall be reported as the highest and lowest readings by cycling of the highest and lowest thermocouple through a complete cycle.

7.1.5 Records shall indicate that thermocouple corrections are used.

7.2 System Accuracy (Probe) Tests

7.2.1 The procedure and frequency of tests shall conform to AMS 2750 unless other applicable specifications require a more frequent testing.

7.2.2 Records shall indicate that thermocouple correction factors are:

a. Used correctly
b. The basis for any frequency reduction
c. The difference between the test sensor and the working sensor

7.2.3 The temperature recorded during the probe check shall agree with the actual recorder chart temperature.

7.2.4 Logs shall show the date, time, and person who performed this test.

7.3 Instrument Calibration

7.3.1 The procedure and frequency of tests shall conform to AMS 2750 unless other applicable specifications require a more frequent testing.

7.3.2 For working instruments the following shall apply:

a. Accuracy within 0.3% of range
b. Capable of returning to set point within ±2°F after being driven 50°F above and 50°F below set point
c. Sensitive to a millivoltage increase or decrease equivalent to 2°F

8. VACUUM FURNACES

8.1 Procedures shall control the following:

a. Leak-up rate test
b. Calibration of vacuum instruments, recorders, and sensors
c. Quench gas purity
d. Gas quench system integrity (dew point, etc.)
e. Calibration of dew point and other gas contaminant measuring instruments