SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS7109/7

REV. A

Issued 1995-03
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Superseding AS7109/7

(R) Nadcap
Requirements for Heat Treating for Suppliers of Coatings

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 heat treating. Demonstrated compliance (as described in AS7003) to AS7102 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 Operation
AS7102	Nadcap - Requirements for Heat Treating
AS7109	Nadcap - Requirements for Coatings
AMS 2750	Pyrometry

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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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.

3.2.4 Procedures (i.e., sketches, photographs or detailed instructions, etc.) shall specify placement of load thermocouples, racking of parts and placement of parts in the furnace work zone.

3.3 Preventative Maintenance:

3.3.1 Maintenance schedules shall be prepared for each furnace.

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

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

4. FURNACE CONDITION:

4.1 Exterior 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 There shall be evidence that safety interlocks, flame curtains, burn offs, and/or other safety items are operational.

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

4.2 Interior Furnace Components - For each furnace where practical:

4.2.1 The composition and condition of the interior furnace components (e.g., refractory, metals, insulation, heating elements, and element insulators) shall 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.

5.4 Purging:

5.4.1 Procedures shall cover purging.

5.4.2 There shall be a procedure to monitor 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 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:

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.

7.1.3.1 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.

7.1.3.2 Records shall indicate that thermocouple corrections are used.

7.2 System Accuracy (Probe) Tests:

7.2.1 The procedures 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 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.