

AEROSPACE MATERIAL SPECIFICATION



AMS 3135E

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Superseding AMS 3135D

Coating Material, Silicone Resin
205°C (400°F) Cure

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of August 2001. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE.

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1. SCOPE:

1.1 Type:

This specification covers an unpigmented silicone-resin-base coating material.

1.2 Application:

Primarily for use on chemically or electrochemically treated magnesium and aluminum alloy surfaces to improve the high temperature corrosion and abrasion resistance and the air flow characteristics. The coating may also be used on steel for improvement of corrosion resistance.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 Standards and Test Methods

AMS 2476 Electrolytic Treatment, Magnesium Base Alloys, Alkaline Type, Full Cast

AMS 4375 Magnesium Alloy Sheet and Plate, 3.0Al - 1.0Zn (AZ31B-0)

2.2 ASTM Publications:

Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B117 Salt Spray (Fog) Testing

ASTM D56 Flash Point by Tag Closed Tester

ASTM D445 Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)

ASTM D471 Rubber Property - Effect of Liquids

ASTM D1475 Density of Paint, Varnish, Lacquer, and Related Products

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Specifications:

PPP-P-1892 Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing, and Marking of

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall be as follows:

3.1.1 Resin Coating (by weight):

Nonvolatile	18 - 22%
Volatile	78 - 82%

3.1.1.1 Nonvolatile: Shall be a thermosetting silicone resin.

3.1.1.2 Volatiles: Shall be a mixture of aromatics, olefins, and aliphatics as required to produce a product meeting the requirements of 3.2.

3.2 Properties:

The product shall conform to the following requirements:

3.2.1 Product Properties:

3.2.1.1 Viscosity: Shall be a 3 - 8 centipoises (0.003 - 0.008 Pa·s) at 25°C (77°F), determined in accordance with ASTM D445.

3.2.1.2 Specific Gravity: Shall be 0.82 - 0.88 at 25°C (77°F), determined in accordance with ASTM D1475.

3.2.1.3 Flash Point: Shall be not lower than -7°C (20°F), determined in accordance with ASTM D56.

3.2.1.4 Stability: Seeding out of resin material shall not occur within 30 days of date of manufacture. Skinning and livering shall be absent in partially-filled, closed containers at any time up to one week of standing.

- 3.2.2 Applied Film Properties: The product shall be freely working and shall have acceptable leveling properties when applied by brushing, spraying, or dipping. Recoating, following air drying for not less than 15 min., shall produce no film irregularity.
- 3.2.3 Cured Film Properties: Shall be as specified in 3.2.3.1 through 3.2.3.6, determined on panels prepared as in 4.5.1.
- 3.2.3.1 Color and Appearance: The cured film shall be transparent, smooth, uniform, and free from craters, pin holes, sags, runs, bubbles, heavy edges, and other imperfections affecting its continuity. The film shall retain a distinct coloration.
- 3.2.3.2 Heat Resistance: The film shall withstand exposure to air at $260^{\circ}\text{C} \pm 5$ ($500^{\circ}\text{F} \pm 10$) for not less than 48 hr without evidence of chalking, blistering, or loss of adhesion.
- 3.2.3.3 Corrosion Resistance: Panels subjected to the heat resistance test of 3.2.3.2 shall show no evidence of corrosion after exposure for not less than 200 hr to salt spray test conducted in accordance with ASTM B117.
- 3.2.3.4 Fuel Resistance: Films shall withstand immersion for not less than 100 hr in ASTM Reference Fuel B (ASTM D471) at room temperature without appreciable softening or other evidence of deterioration.
- 3.2.3.5 Oil Resistance: Films shall withstand immersion for not less than 100 hr in ASTM Service Fluid No. 101 (ASTM D471) at $150^{\circ}\text{C} \pm 2$ ($300^{\circ}\text{F} \pm 5$) without appreciable softening. Slight discoloration of the film will be acceptable.
- 3.2.3.6 Adhesion: Film shall not crack, loosen from the panel, or flake at the bend when a panel is bent rapidly at room temperature through an angle of 180 deg around a diameter equal to six times the nominal thickness of the panel.

3.3 Quality:

Coating material, as received by purchaser, shall be clear, transparent, homogeneous, and amber colored. It shall be free from bubbles. There shall be no trace of grit or rough particles. Material shall contain no substance of known toxicity under normal conditions of use.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

- 4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), viscosity (3.2.1.1), specific gravity (3.2.1.2), flash point (3.2.1.3), applied film properties (3.2.2), color and appearance (3.2.3.1), fuel resistance (3.2.3.4), and adhesion (3.2.3.6) are classified as acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Tests to determine conformance to requirements for heat resistance (3.2.3.2), corrosion resistance (3.2.3.3), and oil resistance (3.2.3.5) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.
- 4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of coating material to a purchaser, when a change in material or processing, or both, requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling:

Shall be as follows:

- 4.3.1 For Acceptance Tests: Sufficient coating material shall be taken at random from each lot to permit making the following numbers of determinations; a lot shall be all coating material produced in one continuous manufacturing operation from the same batches of raw materials and presented for vendor's inspection at one time. An inspection lot shall not exceed 500 gal (2000 L) and may be packaged in small quantities under the basic lot approval provided lot identification is maintained.

Requirement	Reference Paragraph	Number of Determinations
Composition	3.1	1
Viscosity	3.2.1.1	1
Specific Gravity	3.2.1.2	1
Flash Point	3.2.1.3	1
Applied Film Properties	3.2.2	3 (See 4.3.1.1)
Color and Appearance	3.2.3.1	3 (See 4.3.1.1)
Fuel Resistance	3.2.3.4	2
Adhesion	3.2.3.6	3

- 4.3.1.1 These requirements are to be determined on the panels prepared for other tests.
- 4.3.1.2 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.
- 4.3.2 For Periodic Tests and Preproduction Tests: As agreed upon by purchaser and vendor.
- 4.4 Approval:
- 4.4.1 Coating material shall be approved by purchaser before coating material for production use is supplied, unless such approval be waived by purchaser. Results of tests on production coating material shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production coating material which are essentially the same as those used on the approved sample coating material. If necessary to make any change in ingredients, in type of equipment for processing or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material or processing, or both, and, when requested, sample coating material. Production coating material made by the revised procedure shall not be shipped prior to receipt of reapproval.
- 4.5 Test Methods:
- 4.5.1 Panel Preparation: Panels shall be AMS 4375 or equivalent magnesium alloy sheet, approximately 0.020 x 3 x 6 in. (0.5 x 75 x 150 mm), and shall have smooth edges and rounded corners. Panels shall be treated in accordance with AMS 2476. The coating material shall be applied by spraying a sufficient amount to wet the surface of the panels completely. Application shall be controlled to provide a continuous, uniform film free from bubbles, heavy edges, and other surface irregularities. A total of three coats shall be applied. Each coat shall be air dried for not less than 15 min. at room temperature. After air-drying the final coat, panels shall be heated at $205^{\circ}\text{C} \pm 5$ ($400^{\circ}\text{F} \pm 10$) for 60 min. ± 5 .
- 4.6 Reports:
- The vendor of coating material shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the coating material conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3135E, formula number, lot number, and quantity.
- 4.7 Resampling and Retesting:
- If any sample or panel fails to meet the specified requirements, disposition of the coating material may be based on the results of testing three additional samples or panels for each original nonconforming sample or panel. Failure of any retest sample or panel to meet the specified requirements shall be cause for rejection of the coating material represented and no additional testing shall be permitted. Results of all tests shall be reported.