SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3110J

Issued	1940-10
Revised	1992-01
Noncurrent	2001-08
Cancelled	2009-06

Superseding AMS3110H

Primer, Zinc Chromate

RATIONALE

AMS3110J has been designated cancelled.

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of June 2009. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications indicating that it has been "CANCELLED".

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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3110H

Issued OCT 1940
Revised JAN 1992
Noncurrent AUG 2001

Superseding AMS 3110G

Primer
Zinc Chromate

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 a zinc chromate primer in the form of a liquid.

1.2 Application:

This product has been used typically as a protective coating on metals and on molded or laminated synthetic resins, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification 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.

AMS 2825	Material Safety Data Sheets
AMS 3180	Toluene Thinner, Commercial
AMS 4037	Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate), Solution Heat Treated
AMS 4040	Aluminum Alloy Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (Alclad 2024 and 1-1/2% Alclad 2024-0), Annealed

2.2 ASTM Publications:

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

ASTM D 185	Coarse Particles in Pigments, Pastes, and Paints
ASTM D 471	Rubber Property - Effect of Liquids
ASTM D 1084	Viscosity of Adhesives
ASTM D 1364	Water in Volatile Solvents (Fischer Reagent Titration Method)
ASTM D 1475	Density of Paint, Varnish, Lacquer, and Related Products
ASTM D 3359	Measuring Adhesion by Tape Test

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

PPP-P-1892	Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing and Marking of
FED-STD-595	Color

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3. TECHNICAL REQUIREMENTS:

Shall be as follows:

3.1 Composition:

3.1.1 Primer (by weight): Nonvolatile portion shall be 59 - 62%; volatile portion shall be 38 - 41%.

3.1.1.1 Nonvolatile: Resin portion of the nonvolatile shall be 42 - 47%; pigment portion shall be 53 - 58%.

3.1.1.1.1 Resin: Shall consist of 81 - 84% drying-type phthalic anhydride plus 16 - 19% oil-modified phenol-aldehyde resin. It shall be free of rosin and rosin derivatives.

3.1.1.1.2 Pigment: Shall consist of not less than 85% zinc chromate and not more than 15% siliceous extenders. A relatively small amount of other chromates is acceptable.

3.1.1.2 Volatile: The composition of the volatile component shall be optional with the manufacturer and shall meet applicable air pollution control regulations.

3.2 Properties:

Primer shall conform to the following requirements:

3.2.1 Product Properties:

3.2.1.1 Color: Shall be yellow, characteristic of zinc chromate, unless a green tinted product is ordered, in which case the color shall match Interior Green, Color No. 34151 of FED-STD-595.

3.2.1.2 Density: Shall be 9.8 - 10.7 pounds per gallon (1174 - 1282 kg/m^3), determined at 77 °F ± 2 (25 °C ± 1) in accordance with ASTM D 1475.

3.2.1.3 Coarse Particles: Not more than 0.05% by weight, calculated on the basis of total solids, shall be retained on a No. 325 (45 mm) sieve, determined in accordance with ASTM D 185.

3.2.1.4 Water Content: Shall not exceed 0.5% by weight, determined in accordance with ASTM D 1364.

3.2.1.5 Viscosity: Shall be 26 - 36 seconds at 77 °F (25 °C), determined in accordance with ASTM D 1084, Method D, using a No. 1 Zahn cup and a mixture of one part of primer and one part of AMS 3180 thinner.

3.2.1.6 Stability: Primer, from a full, closed container which has been stored at 120 °F ± 5 (49 °C ± 3) for 96 hours ± 0.5, shall produce films showing no seediness or clear areas lacking in yellow color when one volume of aged primer is reduced with two volumes of AMS 3180 thinner. After aging, the consistency of the primer shall be such that it is suitable for production use. Slight silking is permissible provided a continuous film is produced.

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3.2.1.7 Skinning and Livering: Shall be absent in a quarter-filled, closed container after standing for 24 hours ± 0.2 at room temperature.

3.2.1.8 Separation: There shall be not more than 10 mL of clear or cloudy supernatant liquid when 70 mL of a mixture of one volume of primer with 2.5 volumes of AMS 3180 thinner is allowed to stand for 4 hours ± 0.25. After standing for 24 hours ± 0.5, all pigment shall be completely replaced in suspension by vigorously shaking the graduate for not more than 60 seconds. A flow-out film on an aluminum alloy panel immediately following the shaking shall show no seediness or clear areas lacking in yellow color. Slight silking is permissible provided a continuous film is produced.

3.2.1.9 Dip Tank Stability: A mixture of one volume of primer and two volumes of AMS 3180 thinner shall be suitable for use in dip tanks, as shown by passing the test of 3.2.1.9.1.

3.2.1.9.1 A container of suitable size shall be filled to approximately 80% of capacity with the mixture specified in 3.2.1.9. Air shall be bubbled through the mixture, at a rate of approximately 1 liter/minute per 100 mL of mixture, for a total of 200 hours ± 0.5. Aeration may be interrupted as necessary to fit working schedules. During aeration, the level of the mixture shall be maintained by additions of AMS 3180 thinner at least every 12 hours ± 0.5 or by bubbling the influent air through AMS 3180 thinner, or both. In addition, the nonvolatile matter shall be maintained in suspension by mechanical agitation or shall be replaced in suspension by stirring with a spatula or other suitable instrument at least once each day. At the end of 200 hours, there shall be no appreciable oxidation or gelling of the resins and a dipped film of the aerated mixture on an aluminum alloy panel shall be free from seeding. Slight silking is permissible provided a continuous film is produced.

3.2.2 Air-Drying Film Properties: Shall be as specified in 3.2.2.1.1, 3.2.2.1.2, 3.2.2.2, 3.2.2.3, 3.2.2.4, and 3.2.2.5, determined on panels prepared as in 4.5.1.

3.2.2.1 Drying Time:

3.2.2.1.1 A thin, wet, cross-coat showing a semi-transparent film shall air-dry for handling in not more than 5 minutes. After air-drying for 1 hour ± 0.1, stacking the panels at room temperature under a pressure of one psi (6.9 kPa) for 1 hour ± 0.1 shall not cause the panels to stick to each other.

3.2.2.1.2 The film from 3.2.2.1.1 shall be suitable for recoating, after 30 minutes ± 1 air drying, with a high gloss lacquer, without undue absorption of primer by the lacquer or loss of gloss of the lacquer.

3.2.2.2 Lacquer Resistance: The finish shall show no embrittlement, lifting, or excessive loss of gloss after being coated with cellulose nitrate lacquer over the primer on a series of panels on which the primer has been air-dried for 10 minutes, 1 hour, 6 hours, 16 hours, and 48 hours, respectively.

3.2.2.3 Water Resistance: Flow-out films, air-dried for 48 hours ± 0.5, shall withstand immersion in freshly-boiled, distilled water at room temperature for 24 hours ± 0.5 without checking or blistering of the film. After 20 hours ± 0.1 air drying following immersion, films shall show no evidence of excessive leaching.

3.2.2.4 Non-Aromatic Fuel Resistance: Flow-out films, air-dried for 48 hours ± 0.5 shall withstand total immersion in ASTM Reference Fuel A (ASTM D 471) at room temperature for 4 hours ± 0.2; 24 hours ± 0.2 after removal from the fuel, the film shall show no apparent deterioration when compared with a similar panel not immersed in fuel.

3.2.2.5 Weather Resistance (Durability): The primer, with and without top coats, shall have weather resistance acceptable to purchaser, determined by a procedure acceptable to purchaser.

3.2.3 Baked Film Properties: Shall be as specified in 3.2.3.1 and 3.2.3.2 determined on panels prepared as in 4.5.1.

3.2.3.1 Flexibility: Flow-out films, air-dried 5 minutes, baked at 350 to 365 °F (177 to 185 °C) for 4 hours ± 0.2, and cooled to room temperature, shall not crack when the panel is bent through an angle of 180 degrees around a mandrel having a diameter six times the nominal thickness of the panel. Panel materials other than as in 4.5.1 may be used when agreed upon by purchaser and vendor.

3.2.3.2 Adhesion: Shall be as follows, determined in accordance with ASTM D 3359, Method A:

3.2.3.2.1 Primer to Substrate: The adhesion rating shall be 5A on sprayed film having a film thickness of 0.0005 - 0.00075 inch (12.7 - 19 mm) baked at 212 °F ± 2 (100 °C ± 1) for 4 hours ± 0.25.

3.2.3.2.2 Top Coat to Primer: The adhesion rating shall be 4A or better determined on duplicate panels prime-coated and baked as in 3.2.3.2.1 and coated with one coat of cellulose nitrate lacquer. The lacquer coat on one panel shall be air dried for 1 hour ± 1 and baked at 212 °F ± 2 (100 °C ± 1) for 16 hours ± 0.25. The lacquer coat on the other panel shall be air dried until baking of the first panel is completed.

3.3 Quality:

Primer, as received by purchaser, shall be of uniform consistency and free from bubbles, grit, rough particles, floating or caked pigments, and ingredients of respiratory toxicity under normal conditions of use. Component ingredients shall be intimately mixed and processed as required to produce a product which is stable and not subject to abnormal change with age in sealed containers.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of primer shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the primer conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), color (3.2.1.1), density (3.2.1.2), viscosity (3.2.1.5), drying time (3.2.2.1), fuel resistance (3.2.2.4), and adhesion (3.2.3.2) are acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of primer to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 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, contracting officer, or request for procurement.

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient primer shall be taken at random from each lot to perform the tests shown in Table 1.

TABLE 1 - Acceptance Tests

Requirement	Reference Paragraph	Number of Determinations
Composition	3.1	1
Color	3.2.1.1	2
Density	3.2.1.2	1
Viscosity	3.2.1.5	1
Drying Time	3.2.2.1.1	2 (See 4.3.1.1)
Fuel Resistance	3.2.2.4	2
Adhesion	3.2.3.2	2

4.3.1.1 Drying time test shall be determined on the panels prepared for other tests.

4.3.1.2 A lot shall be all primer made from the same batches of ingredients in a continuous series of operations and presented for vendor's inspection at one time.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Primer shall be approved by purchaser before primer for production use is supplied, unless such approval be waived by purchaser. Results of tests on production primer shall be essentially equivalent to those on the approved sample.

4.4.2 Vendor shall use the same ingredients, manufacturing procedures and processes, and methods of inspection on production primer which are essentially the same as those used on the approved sample primer. If necessary to make any change in ingredients or in manufacturing procedures or processing, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample primer. Production primer 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 prepared from AMS 4040 aluminum alloy, except that for determination of adhesion properties panels shall be of AMS 4037 aluminum alloy. Panels shall be completely coated with a mixture of one volume of primer and two volumes of AMS 3180 thinner.

4.6 Reports:

The vendor of primer shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the primer conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3110G, formula number, and quantity.

4.6.1 A material safety data sheet conforming to AMS 2825 or equivalent shall be supplied to each purchaser prior to, or concurrent with, the report of preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of primer for production use. Each request for modification of primer formulation shall be accompanied by a revised data sheet for the proposed formulation.

4.7 Resampling and Retesting:

If any sample used in the above tests fails to meet the specified requirements, disposition of the primer may be based on the results of testing three additional samples for each original nonconforming sample. Failure of any retest sample to meet the specified requirements shall be cause for rejection of the primer represented. Results of all tests shall be reported.