SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3120G

Issued	1940-06
Revised	1984-01
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Reaf. Noncur.	2004-02
Cancelled	2009-06

Superseding AMS3120F

Enamel, Glyceryl Phthalate Black Baking

RATIONALE

AMS3120G 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".

Cancelled specifications are available from SAE.

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3120F

Issued JUN 1940
Revised JAN 1984
Reaffirmed APR 1994
Noncurrent FEB 1998
Reaf. Noncur. FEB 2004
Superseding AMS 3120E

Enamel, Glyceryl Phthalate Black Baking

NONCURRENT NOTICE

This specification has been declared “NONCURRENT” by the Aerospace Materials Division, SAE, as of February 1998. 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 upon request.

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1. SCOPE:

1.1 Type:

This specification covers a gloss, black baking enamel based on a glyceryl phthalate resin.

1.2 Application:

Primarily as an exterior protective coating for metal surfaces.

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 2825 - Material Safety Data Sheets
AMS 4037 - Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024-T3 Flat Sheet, -T351 Plate)

2.2 ASTM Publications:

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

ASTM D56 - Flash Point by Tag Closed Tester
ASTM D185 - Coarse Particles in Pigments, Pastes, and Paints
ASTM D445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D471 - Rubber Property - Effect of Liquids
ASTM D1364 - Water in Volatile Solvents (Fischer Reagent Titration Method)
ASTM D1640 - Drying, Curing, or Film Formation of Organic Coatings at Room Temperature

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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:

3.1.1 Enamel (by weight):

	min	max
Resin	36	44%
Pigment	2	6%
Volatile	--	60%

3.1.1.1 Resin: Shall be a glyceryl phthalate type modified, if necessary, with small amounts of other resins and shall contain not less than 31% phthalate anhydride equivalent. It shall be free from rosin and rosin derivatives.

3.1.1.2 Pigment: Shall consist of carbon black, with additions of iron blue if necessary, in proportions required to produce an enamel meeting the requirements of 3.2.3.2.

3.1.1.3 Volatile: Shall be optional with the manufacturer but shall meet all applicable air pollution control regulations.

3.2 Properties:

Enamel shall conform to the following requirements:

3.2.1 Product Properties:

3.2.1.1 Viscosity: Shall be 300 - 700 centipoises (0.3 - 0.7 Pa·s) at 77°F (25°C) not less than 24 hr after manufacture, determined in accordance with ASTM D445.

3.2.1.2 Flash Point: Shall be not lower than 70°F (20°C), determined in accordance with ASTM D56.

3.2.1.3 Moisture Content: Shall not exceed 0.1% by weight, determined in accordance with ASTM D1364.

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3.2.1.4 Skinning and Livering: Shall be absent in 1/4-filled closed containers after standing at least 7 days.

3.2.1.5 Coarse Particles: Not more than 0.1% by weight of the enamel shall be retained on a No. 325 (45 µm) sieve, determined in accordance with ASTM D185.

3.2.2 Applied Film Properties: Shall be as specified in 3.2.2.1, 3.2.2.2, and 3.2.2.3, determined on panels prepared as in 4.5.1.

3.2.2.1 Leveling: Enamel, applied by brushing or spraying, shall be a freely working product with leveling properties acceptable to purchaser.

3.2.2.2 Air Drying: Coating shall have set-to-touch time not longer than 4 hr at 77°F ± 5 (25°C ± 3), determined in accordance with ASTM D1640.

3.2.2.3 Curing: A coat shall dry firm and hard in not more than 30 min. when baked at 300°F ± 5 (150°C ± 3), and in not more than 90 min. when baked at 250°F ± 5 (120°C ± 3). Film, upon drying, shall be free from streaks, blisters, silking, and other surface irregularities.

3.2.3 Cured Film Properties: Shall be as specified in 3.2.3.1, 3.2.3.2, 3.2.3.3, 3.2.3.4, 3.2.3.5, and 3.2.3.6, determined on panels prepared as in 4.5.1.

3.2.3.1 Appearance: Film shall be hard, tough, smooth, and free from defects such as checking, wrinkling, and dulling. It shall show no appreciable discoloration.

3.2.3.2 Color and Gloss: A coat, baked for not less than 30 min. at 300°F ± 5 (150°C ± 3), shall closely match the color and gloss of the standard panel specified by purchaser.

3.2.3.3 Flexibility and Adhesion: Film shall not crack or peel when a panel is bent rapidly at 32°F± 2 (0°C ± 1) through an angle of 180 deg around a diameter equal to six times the nominal thickness of the panel and shall adhere tenaciously to the bent portion of the panel. Film shall show fine feathered edges on drawing a knife blade over the bent portion of the film.

3.2.3.4 Heat Resistance: Film shall show no cracks, checks, blisters, or other defects after being heated for 24 hr ± 0.5 at 500°F ± 10 (315°C ± 5). Dulling or change in color shall be acceptable.

3.2.3.5 Hot Water Resistance: Film, immersed in boiling water for 10 min. ± 0.2 and observed 5 min. after removal, shall show no cracking, no blistering, no appreciable whitening, and not more than very slight dulling; when observed 15 min. after removal, film shall show no whitening. After 3 hr air-drying, film on immersed end shall be equal in hardness, toughness, and adhesion to film which was not immersed, determined by drawing a knife blade over the respective ends of the panel; film shall also be equal in gloss to film which was not immersed.

3.2.3.6 Aliphatic Petroleum Fuel Resistance: Film, immersed at room temperature in ASTM Reference Fuel A (ASTM D471) for 4 hr ± 0.1 and dried for 24 hr ± 0.5 at room temperature after removal from fuel, shall be equal in hardness, toughness, and adhesion to film on a panel not subjected to fuel, determined by drawing a knife blade over the respective panels; film also shall be equal in gloss to film which was not subjected to fuel.

3.3 Quality:

Enamel, as received by purchaser, shall be of uniform consistency and free from bubbles, toxic ingredients, grit, rough particles, and floating or caked pigments. 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 enamel 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 enamel 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), air-drying (3.2.2.2), appearance (3.2.3.1), flexibility and adhesion (3.2.3.3), and fuel resistance (3.2.3.6) are classified as acceptance tests and shall be performed on each lot.

4.2.2 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 enamel 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.

4.2.2.1 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, the contracting officer, or the request for procurement.

4.3 Sampling:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient enamel shall be taken from each lot to perform the following tests:

Requirement	Reference Paragraph	Number of Determinations
Composition	3.1.1	1
Viscosity	3.2.1.1	1
Air-Drying	3.2.2.2	1
Appearance	3.2.3.1	2 (See 4.3.1.1)
Flexibility and Adhesion	3.2.3.3	2
Fuel Resistance	3.2.3.6	2

4.3.1.1 This requirement is to be determined on the panels prepared for the flexibility and adhesion test.

4.3.1.2 A lot shall be all enamel produced in one continuous manufacturing operation from the same lots of raw materials 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 Enamel shall be approved by purchaser before enamel for production use is supplied, unless such approval be waived by purchaser. Results of tests on production enamel 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 enamel which are essentially the same as those used on the approved sample enamel. 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 material or processing, or both, and, when requested, sample enamel. Production enamel 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 anodized AMS 4037 aluminum alloy except that panels for color and gloss tests (3.2.3.2) shall be of glass. Panels shall be completely coated with enamel suitably thinned to viscosity of 100 - 125 centipoises (0.100 - 0.125 Pa·s); air-drying and curing of films for determination of cured properties (3.2.3) shall be performed as follows:

4.5.1.1 Air-Drying: Films shall be air-dried at room temperature for not less than 15 minutes.