



400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 3075E

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Superseding AMS 3075D

Submitted for recognition as an American National Standard

COMPOUND, CORROSION-PREVENTIVE Hard Film, Hot Application

1. SCOPE:

1.1 Form:

This specification covers a stable, nonvolatile, petroleum-base compound in a form suitable for application by dipping at 170 to 210 °F (77 to 99 °C).

1.2 Application:

This compound has been used typically for preservation of metal parts, tools, subassemblies, and equipment during shipment and storage where a compound readily removable without component damage is required, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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.

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 3160 Solvent, Petroleum

AMS 4037 Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn
(2024; - T3 Flat Sheet, - T351 Plate), Solution Heat Treated

AMS 5044 Steel Sheet and Strip, 0.15 Carbon, maximum, Half Hard Temper

2.2 ASTM Publications:

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

ASTM B 117 Salt Spray (Fog) Testing

ASTM D 92 Flash and Fire Points by Cleveland Open Cup

ASTM D 127 Drop Melting Point of Petroleum Wax, Including Petrolatum

ASTM D 217 Cone Penetration of Lubricating Grease

ASTM D 1748 Rust Protection by Metal Preservatives in the Humidity Cabinet

2.3 U.S. Government Publications:

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

MIL-STD-290 Packaging of Petroleum and Related Products

3. TECHNICAL REQUIREMENTS:

3.1 Setting:

Compound, applied to metal parts, shall set to a firm, hard film within 24 hours at 68 to 86 °F (20 to 30 °C) and, after 120 hours standing, shall not have checked or cracked exposing the metal surface underneath.

3.1.1 Toxicity: Compound shall not contain materials of known toxicity. The vapor shall not cause discomfort or injury to workmen engaged in application of the compound.

3.1.2 Abrasiveness: Compound shall not contain abrasive substances.

3.2 Properties:

Compound shall conform to the requirements shown in Table 1 and 3.2.5 through 3.2.14; tests shall be conducted in accordance with specified test methods:

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TABLE 1 - Properties

Property	Value	Test Method
3.2.1 Melting Point	150 to 170 °F (66 to 77 °C)	ASTM D 127
3.2.2 Flash Point, minimum	350 °F (177 °C)	ASTM D 92
3.2.3 Consistency	30 to 90	ASTM D 217
3.2.4 Nonvolatile Matter by weight, minimum	99.0%	4.5.1
3.2.5 Stability: Compound shall remain homogeneous with age, determined in accordance with 4.5.2.		
3.2.6 Application and Removability: Compound shall form a continuous, completely protective film on metal surfaces under normal conditions of storage in all climates; it shall be readily removed by dipping in, or spraying with, AMS 3160 petroleum solvent or by wiping with cloths saturated with the solvent.		
3.2.7 Wetting Properties and Low-Temperature Adhesion: Compound shall thoroughly wet the surface of test panels, shall form a smooth, unbroken film and shall show satisfactory adhesion, determined in accordance with 4.5.3.		
3.2.8 Rosin: Compound shall show no evidence of the presence of rosin, determined in accordance with 4.5.4.		
3.2.9 Acidity: Compound shall show no evidence of the presence of inorganic acid, determined in accordance with 4.5.5.		
3.2.10 Lead Solubility: Compound shall not cause a change in weight of a lead specimen of more than 5 milligrams per square inch (0.78 mg/cm ²), determined in accordance with 4.5.6.		
3.2.11 Loss on Heating: Compound shall lose not more than 5% in weight when tested as in 4.5.7.		
3.2.12 Humidity Protection: Panels coated with the compound in accordance with 4.5.8.1, exposed to humid atmosphere for not less than 28 days, shall meet the requirements of 4.5.8.2.		
3.2.13 Salt Spray Protection: Panels coated with the compound in accordance with 4.5.9.1 and exposed to salt spray in accordance with 4.5.9.2 shall protect metal panels from corrosion and pitting for not less than the times shown in Table 2.		

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TABLE 2 - Salt Spray Corrosion Parameters

Panel Material	Protection Time Days, minimum
Sand blasted steel	7
Polished steel	7
Polished aluminum	28

3.2.14 Corrosion: Compound shall not corrode polished steel, copper, magnesium, aluminum, or cadmium plate when maintained in contact with those metals for four hours ± 0.25 at $210^{\circ}\text{F} \pm 2$ ($99^{\circ}\text{C} \pm 1$).

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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The vendor of compound 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 compound conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for melting point (3.2.1), application and removability (3.2.6), wetting properties and low-temperature adhesion (3.2.7), humidity protection (3.2.12), and salt spray protection (3.2.13) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for flash point (3.2.2), consistency (3.2.3), non-volatile matter (3.2.4), stability (3.2.5), rosin (3.2.8), acidity (3.2.9), lead solubility (3.2.10), and loss on heating (3.2.11) are 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 for all technical requirements are preproduction tests and shall be performed prior to or on the first article shipment of compound 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.

4.2.3.1 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, contracting officer, or request for procurement.

4.3 Sampling and Testing:

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Shall be as follows; a lot shall be all compound produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time.

4.3.1 Acceptance Tests: Sufficient compound shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than two.

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

4.4 Approval:

4.4.1 Sample compound shall be approved by purchaser before compound for production use is supplied, unless such approval be waived by purchaser. Results of tests on production compound 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 compound which are essentially the same as those used on the approved sample compound. 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 ingredients and/or processing and, when requested, sample revised compound. Production compound made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Nonvolatile Content: Weigh approximately 5 grams of compound to the nearest milligram into a tared evaporating dish. Heat the dish and contents in an oven at 221 to 230 °F (105 to 110 °C) for 24 hours $\pm$ 0.25. Cool to room temperature, reweigh, and calculate the nonvolatile content using Equation 1.

$$\text{Nonvolatile Content, \%} = \frac{A \times 100}{B} \quad (\text{Eq. 1})$$

Where, A = weight of residue, grams
B = original weight of sample, grams

4.5.2 Stability: A sample of compound shall be placed in a test tube, heated to 220 °F $\pm$ 2 (104 °C $\pm$ 1), and maintained at that temperature for 60 minutes $\pm$ 5. Tube and compound shall be cooled to room temperature, held for 60 minutes $\pm$ 5, further cooled to -40 °F $\pm$ 2 (-40 °C $\pm$ 1), and maintained at that temperature for 60 minutes $\pm$ 5. Tube and compound shall be reheated to 220 °F $\pm$ 2 (104 °C $\pm$ 1) and maintained at that temperature for 60 minutes $\pm$ 5. Compound, after returning to room temperature, shall be examined for homogeneity.

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- 4.5.3 Wetting Properties and Low-Temperature Adhesion: Two polished and alkaline-cleaned panels of AMS 5044 steel, or equivalent, nominally 1/16 x 4 x 2 inch (1.6 x 102 x 51 mm), or equivalent, shall be immersed for one minute in compound at 205 to 210 °F (96 to 99 °C), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at 77 °F $\pm$ 7 (25 °C $\pm$ 4) for 24 hours $\pm$ 0.5. Panels shall be cooled to 0 °F $\pm$ 2 (-18 °C $\pm$ 1), and maintained at that temperature for 60 minutes $\pm$ 5. While at 0 °F $\pm$ 2 (-18 °C $\pm$ 1), four parallel scratches about 1/8 inch (3.2 mm) apart and 1 inch (25 mm) long shall be made in the compound film with a pointed knife blade; four similar scratches which intersect the first four at right angles shall also be made. There shall be no flaking of the film within the area bounded by the scratches.
- 4.5.4 Rosin: Add 10 grams of compound to 25 mL of 95% ethyl alcohol and heat the mixture to boiling. One or two drops of the solution of compound in alcohol shall be placed on a porcelain spotplate with three or four drops of acetic anhydride. Add one drop of chemically pure sulfuric acid. A rose-violet coloration, or a flash of purple produced when the acid meets the anhydride, indicates the presence of rosin.
- 4.5.5 Acidity (Inorganic Acid): A 25 to 50 gram sample of compound shall be introduced into a 250 mL separatory funnel followed by 100 mL of boiling distilled water. The funnel shall be shaken vigorously and, after compound and water have separated, the water layer shall be drained into a 500 mL casserole. Compound in the funnel shall be washed twice more by vigorously shaking with 50 mL portions of boiling distilled water. After each washing and separation, the water layer shall be drained into the casserole. One drop of 1% solution of phenolphthalein shall be added to the 200 mL of accumulated water and the water boiled. A change in color to pink indicates the solution is alkaline. If addition of phenolphthalein causes no change in color, two drops of 0.1% solution of methyl orange shall be added. A change to red or pink indicates the presence of inorganic acid.
- 4.5.6 Lead Solubility: A polished specimen of lead sheet, nominally 1/16 x 1 x 1 inch (1.6 x 25 x 25 mm), shall be accurately weighed and immersed for four hours $\pm$ 0.25 in 50 grams $\pm$ 1.0 of compound maintained at 205 to 210 °F (96 to 99 °C). Specimen shall be removed, cleaned with solvent, and reweighed. Change in weight per square inch (per cm²) shall be calculated.
- 4.5.7 Loss on Heating: Two polished and alkaline-cleaned panels of AMS 5044 steel, or equivalent, nominally 1/16 x 4 x 2 inches (1.6 x 102 x 51 mm), shall be weighed to the nearest milligram. Panels shall be immersed for one minute in compound at 205 to 210 °F (96 to 99 °C), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at 77 °F $\pm$ 7 (25 °C $\pm$ 4) for 24 hours $\pm$ 0.25. Panels shall be weighed to determine the weight of the coating and then suspended for four hours $\pm$ 0.25 in an oven at 135 °F $\pm$ 2 (57 °C $\pm$ 1). After heating, panels shall be carefully removed from the oven, cooled to room temperature, and reweighed. The percentage loss in weight shall be calculated.

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4.5.8 Humidity Protection:

- 4.5.8.1 Two freshly sand-blasted panels and two polished and alkaline-cleaned panels of AMS 5044 steel, or equivalent, and two polished panels of AMS 4037 aluminum sheet, each panel nominally 1/16 x 4 x 2 inches (1.6 x 102 x 51 3mm), shall be immersed for one minute in compound at 205 to 210 °F (96 to 99 °C), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at 77 °F $\pm$ 7 (25 °C $\pm$ 4) for 24 hours $\pm$ 0.25.
- 4.5.8.2 After conditioning as in 4.5.8.1, all panels shall be suspended vertically in humid atmosphere for 28 days in accordance with ASTM D 1748. Upon completion of the exposure, panels shall be removed from the cabinet, cleaned with solvent, and examined for visible corrosion or pitting of any surface. If corrosion occurs, but no greater than three spots not larger than 1 millimeter (0.039 inch) in diameter, the compound may be retested. If, on retesting, no corrosion spots occur, the compound shall be acceptable. In any case, corrosion within 1/8 inch (3.2 mm) of an edge shall be disregarded.

4.5.9 Salt Spray Protection:

- 4.5.9.1 Two freshly sand-blasted panels, two polished and alkaline-cleaned panels of AMS 5044 steel, or equivalent, and two polished panels of AMS 4037 aluminum alloy sheet, each panel nominally 1/16 x 4 x 2 inches (1.6 x 102 x 51 mm), shall be prepared. All panels shall be immersed for one minute in the compound at 205 to 210 °F (96 to 99 °C), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at 77 °F $\pm$ 7 (25 °C $\pm$ 4) for 24 hours $\pm$ 0.25.
- 4.5.9.2 After conditioning as in 4.5.9.1, all panels shall be exposed to salt spray in accordance with ASTM B 117 for the time shown in Table 2. Upon completion of the exposure, panels shall be removed from the cabinet, cleaned with solvent, and examined for visible corrosion or pitting. If corrosion occurs, but no greater than three spots not larger than 1 millimeter (0.039 inch) in diameter, the compound may be retested. If, on retesting, no corrosion spots occur, the compound shall be acceptable. In any case, corrosion within 1/8 inch (3.2 mm) of an edge shall be disregarded.

4.6 Reports:

The vendor of compound shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3075E, vendor's material designation, date of manufacture, and quantity.