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AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 3078B

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Submitted for recognition as an American National Standard

Superseding AMS 3078A

COMPOUND, CORROSION - PREVENTIVE
Soft Film, Cold Application

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1. ACKNOWLEDGEMENT:

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. TYPE:

A ready-mixed compound, consisting of a stable, nonvolatile, petroleum-base compound and AMS 3160 petroleum solvent, suitable for application by dipping, brushing, or spraying at 70 F (21C) and higher.

3. APPLICATION:

Protection of metal parts where a soft, readily-removable film is desired and additional protective packaging is provided.

4. TECHNICAL REQUIREMENTS:

When ASTM methods are specified for determining conformance to the following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

4.1 Abrasiveness:

Compound shall not contain abrasive substances.

4.2 Toxicity:

Compound shall contain no materials of known toxicity. The vapor shall not cause discomfort or injury to workmen engaged in application of the compound.

4.3 Coverage:

Compound shall provide a continuous, completely protective film on metal parts under normal conditions of storage in all climates.

4.4 Setting:

Compound as applied to metal parts shall set to a firm, soft film in 24 hr at room temperature (77 F \pm 7 (25 C \pm 3.9)).

4.5 Removability:

Compound shall be readily removable by dipping in, or spraying with, AMS 3160 petroleum solvent or by wiping with cloths saturated with the solvent.

4.6 Corrosion:

Compound shall not corrode polished steel, copper, magnesium, aluminum, or cadmium plate when maintained in contact with those metals for 4 hr at 210 F \pm 2 (98.9 C \pm 1.1).

4.7 Percentage of Nonvolatile Matter:

The percentage (by weight) of nonvolatile matter in each different compound shall be established on the approval sample in accordance with the following procedure. The percentage of nonvolatile matter for succeeding shipments shall not deviate from the established value by more than +5.0% and -1.0% of that value.

- 4.7.1 Ten g of compound shall be weighed to the nearest mg into a tared evaporating dish and the disk and contents heated for 24 hr in an oven at 221 - 230 F (105 - 110 C). After heating, the dish shall be cooled to room temperature and reweighed, and the nonvolatile matter calculated from the residual weight.

4.8 Properties of Nonvolatile Matter:

Nonvolatile matter (either that portion remaining from mixed compound after complete evaporation of the solvent or the original base compound from which the mixed compound was made) shall conform to the following requirements:

- | | | | |
|-------|-------------------|-----------------------------|-------------------------|
| 4.8.1 | Melting Point: | 125 - 150 F (51.7 - 65.6 C) | ASTM D127 |
| 4.8.2 | Flash Point, Min: | 350 F (176.7 C) | ASTM D92 |
| 4.8.3 | Consistency: | 200 - 325 | ASTM D217 (See 4.8.3.1) |
- 4.8.3.1 Consistency sample shall be prepared as follows: After the melting point of the nonvolatile matter has been determined, the consistency tests shall be made on a sample that has been heated to 25 F degrees \pm 3 (13.9 C degrees \pm 1.7) above the melting point and poured at that temperature into a glass dish (100 x 50 mm) up to a height of 40 millimeters. The sample shall then be allowed to cool and set at a temperature of 77 F \pm 7 (25 C \pm 3.9) for 24 hours.
- 4.8.4 Ash Content: The ash content of the nonvolatile matter of each different compound shall be established on the approval sample in accordance with ASTM D482, using a 1 g sample. If the established value is 0.15% or less, the ash for succeeding shipments shall not exceed the established value by more than 20.0% of that value; if the established value is over 0.15%, the ash for succeeding shipments shall not deviate from the established value by more than \pm 10.0% of that value.
- 4.8.5 Miscibility: Nonvolatile matter shall be miscible in all proportions with aircraft engine lubricating oil as evinced by passing the following test:

4.8.5.1 A mixture of 95 parts by volume of ASTM Oil No. 1 (ASTM D471) and 5 parts by volume of nonvolatile matter shall be heated to $170\text{ F} \pm 5$ ($76.7\text{ C} \pm 2.8$) for 15 min., examined for miscibility, cooled to room temperature, and re-examined after 24 hr for any separation.

4.8.6 Oxidation: Nonvolatile matter shall not cause a decrease in presence of more than 10 psi in 100 hr when tested as follows:

4.8.6.1 Apparatus: Unless otherwise specified, the apparatus shall conform generally to Figure 1. The equipment shall consist of a pressure-tight steel bomb and a constant-temperature bath thermostatically controlled to provide an overall temperature variation of 1 F (0.6 C). Oil used in the bath shall be circulated in order to obtain the necessary temperature control. Glass sample dishes and bombs shall be clean; otherwise, erratic results may be obtained. The oxygen used shall be dry and of the highest purity.

4.8.6.2 Preparation of Disks:

4.8.6.2.1 Five 1-5/16 in. diam disks shall be cut from 0.050 in. thick brass sheet having the following composition:

	min	max
Copper	67.00	73.00
Silicon	--	0.07
Iron	--	0.01
Nickel	--	0.01
Lead	--	0.003
Zinc	remainder	

4.8.6.2.2 Disks shall be washed in a suitable alkaline cleaner, rinsed in cold running tap water, and then immersed for 20 sec in the following etching solution:

Water	450 ml
Conc. Nitric Acid	225 ml
Conc. Sulfuric Acid	300 ml
Conc. Hydrochloric Acid	8 ml

4.8.6.2.3 After etching as in 4.8.6.2.2, disks shall be rinsed in cold running tap water and subsequently dipped in the following solution:

Water	770 ml
Sodium Dichromate	68 g
Sulfuric Acid	15 ml

4.8.6.2.4 Disks shall be rinsed with distilled water and dried for 30 min. in an oven maintained at $250\text{ F} \pm 2$ ($121\text{ C} \pm 1.1$).

4.8.6.3 Procedure: A clean brass disk shall be placed in the bottom of each glass dish and $20.0\text{ g} \pm 0.1$ of nonvolatile matter shall be equally distributed over the disk in uniform layers having plane surfaces. The bomb shall be assembled, closed, and cleared of air by introducing oxygen slowly to a pressure of 100 psi and releasing slowly two times. The oxygen pressure shall be raised to 100 psi a third time and the bomb allowed to stand over night to ensure the absence of leaks. The bomb shall then be placed in the bath and the oxygen bled off until a constant pressure of 110 psi is reached in about 2 hours. The temperature of the bath shall then be maintained at $210\text{ F} \pm 1$ ($98.9\text{ C} \pm 0.6$) for 100 hr and the drop in pressure noted.

4.9 Stability:

Compound shall remain homogeneous with age and when tested as follows:

4.9.1 A 15 g sample of compound shall be placed in a test tube, heated to $200\text{ F} \pm 2$ ($93.3\text{ C} \pm 1.1$) and maintained at that temperature for 1 hour. Tube and compound shall be cooled to room temperature and held for 1 hr, then further cooled to $-40\text{ F} \pm 2$ ($-40\text{ C} \pm 1.1$) and maintained at that temperature for 1 hour. Compound, after returning to room temperature, shall be examined for homogeneity.

4.10 Film Thickness:

Film thickness of applied compound shall be 0.001 - 0.002 in. when tested as follows:

4.10.1 Two or more 2 x 4 x 1/16 in. polished and alkaline-cleaned panels of AMS 5042 steel sheet or equivalent shall be weighed to the nearest milligram. Panels shall be dipped in compound at $82\text{ F} \pm 3$ ($27.8\text{ C} \pm 1.7$), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at a temperature of $77\text{ F} \pm 7$ ($25\text{ C} \pm 3.9$) for 24 hours. Panels shall be weighed to determine the weight of film. Film thickness shall be calculated as follows:

$$\text{Film Thickness} = \frac{\text{Weight of Film (g)} \times 0.062}{\text{Density (g/cc)} \times \text{Total Surface Area of Panel (sq in.)}} \quad (\text{Eq. 1})$$

where, 0.062 = Factor to convert from cc to cu inches
Density = Density of nonvolatile matter.

4.11 Wetting Properties and Low Temperature Adhesion:

Compound shall thoroughly wet the surface of test panels, shall form a smooth unbroken film, and shall evince satisfactory adhesion when tested as follows:

4.11.1 Two 2 x 4 x 1/16 in. polished and alkaline-cleaned panels of AMS 5042 steel sheet or equivalent shall be dipped in compound at $82\text{ F} \pm 3$ ($27.8\text{ C} \pm 1.7$), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at a temperature of $77\text{ F} \pm 7$ ($25\text{ C} \pm 3.9$) for 24 hours. Panels shall be cooled to $0\text{ F} \pm 2$ ($-17.8\text{ C} \pm 1.1$), and maintained at that temperature for 1 hour. While at $0\text{ F} \pm 2$ ($-17.8\text{ C} \pm 1.1$), 4 parallel scratches about 1/8 in. apart and 1 in. long shall be made in the compound film with a pointed knife blade; 4 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.

4.12 Humidity Protection:

Compound shall protect metal panels from corrosion and pitting for 30 days when exposed to humid atmosphere as follows:

4.12.1 Test panels 2 x 4 x 1/16 in. shall be prepared. There shall be 2 freshly sand-blasted panels and 2 polished and alkaline-cleaned panels of AMS 5042 steel sheet or equivalent. All panels shall be dipped in compound at $82\text{ F} \pm 3$ ($27.8\text{ C} \pm 1.7$), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at a temperature of $77\text{ F} \pm 7$ ($25\text{ C} \pm 3.9$) for 24 hours.

4.12.2 After conditioning as in 4.12.1, all panels shall be suspended vertically in humid atmosphere for 30 days in accordance with ASTM D1748. Upon completion of the exposure, panels shall be removed from the cabinet, cleaned with solvent, and examined. Visible corrosion or pitting of any surface shall be cause for rejection of the compound. If corrosion occurs, but to no greater extent than 3 spots no larger than 1 mm 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 in. of an edge shall be disregarded.

4.13 Salt Spray Protection:

Compound shall protect metal panels from corrosion and pitting for 14 days when exposed to salt spray as follows:

4.13.1 Test panels 2 x 4 x 1/16 in. shall be prepared. There shall be 2 freshly sand-blasted panels and 2 polished and alkaline-cleaned panels of AMS 5042 steel sheet or equivalent. All panels shall be dipped in compound at $82\text{ F} \pm 3$ ($27.8\text{ C} \pm 1.7$), withdrawn, and suspended vertically in an atmosphere of not more than 60% relative humidity at a temperature of $77\text{ F} \pm 7$ ($25\text{ C} \pm 3.9$) for 24 hours.

4.13.2 After conditioning as in 4.13.1, all panels shall be exposed to salt spray for 14 days in accordance with ASTM B117. Upon completion of the exposure, panels shall be removed from the cabinet, cleaned with solvent, and examined. Visible corrosion or pitting shall be cause for rejection of the compound. If corrosion occurs, but to no greater extent than 3 spots no larger than 1 mm 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 in. of an edge shall be disregarded.