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AEROSPACE MATERIAL SPECIFICATION

AMS 3157A
Superseding AMS 3157

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OIL, FLUORESCENT PENETRANT
High Fluorescence, Solvent Soluble

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

2. APPLICATION: Primarily for use in fluorescent penetrant inspection of parts and assemblies for detection of surface discontinuities and imperfections, particularly when a darkness booth is not available for examination.

3. COMPOSITION: Material shall be composed of suitable oil or oil-like components together with a dye
Ø or other additives necessary to provide a stable, hydrocarbon-solvent-soluble, highly penetrating, fluorescent solution.

4. TECHNICAL REQUIREMENTS: Material shall conform to the following requirements; tests shall be performed in accordance with the issue of listed ASTM methods specified in the latest issue of AMS 2350, insofar as practicable. Tests to determine conformance to the requirements of 4.1, 4.4, and 4.6 are considered routine control tests. Tests to determine conformance to the requirements of 4.2, 4.3, 4.5, and 4.7 are considered periodic control tests.

4.1 Physical Properties:

Ø	Flash Point, min	150 F (65.6 C)	ASTM D56
	Water Content, %, max	0.2	ASTM D95

4.1.1 After initial approval of vendor's product, subsequent shipments shall not deviate from the following
Ø original characteristics in excess of the percentages indicated:

Gravity, deg API	±5%	ASTM D287
Viscosity Kinematic at 100 F (37.8 C), Centistokes	±10%	ASTM D445
Ash, %, max	+5%	ASTM D482
Precipitation Number, max	+10%	ASTM D91

4.2 Toxicity: The oil shall contain materials of not more than low toxicity. The vapor shall not cause
Ø discomfort or injury to persons using the oil.

4.3 Solvent Solubility: Shall be such that the droplets produced when 1 or 2 drops of the material are dropped into a beaker of AMS 3160 petroleum solvent at room temperature shall disperse immediately, leaving only a smoky appearance in the solvent.

4.4 Fluorescent Brightness: Shall be not less than 85% of that found in the original material on which
Ø source approval was granted, when tested as follows; other methods of test may be used when agreed upon by purchaser and vendor.

4.4.1 Test Apparatus: Testing shall be performed using a photoelectric photofluorometer, similar to a
Ø Coleman #12C, equipped with a Coleman B-1-S primary filter which has been sandblasted on the side toward the specimen, a Corning CS-3-132 secondary filter, and reflectance sample holder or equivalent.

4.4.2 Preparation of Specimens: Small amounts of an approved reference penetrant material and the penetrant to be tested shall be diluted with a non-fluorescent volatile solvent, such as methylene chloride, in separate containers, in the ratio of one part sample to nine parts solvent. Both penetrants shall be soluble in the same solvent. The solutions shall be agitated and poured into separate wide mouthed containers. Immediately after the solutions have been poured into the test containers, test paper ø specimens, Munktell's No. 5 or equivalent, cut to fit the sample holder for the photofluorometer, shall be dipped into each solution, withdrawn, and held in a fixture to air dry. When the samples are dry, they shall be placed for 5 minutes in a preheated oven at 225 F ± 5 (107.2 C ± 2.8). Six paper specimens shall be prepared for the reference sample and five paper specimens prepared for the test material.

4.4.3 Test Procedure: Under black light, compare the reference sample specimens with the test material specimens, then use one of the reference specimens as a master for setting the instrument. Place the master specimen under the leaf of the specimen holder, insert into the instrument, and press the shutter button down. If under the black light the test specimen appears brighter than the reference specimen, adjust the aperture control on the instrument so that, by rotating the specimen holder, the ø peak reading on the meter will be near 50. Adjust the reading to near 100 if the reference specimens appeared to be brighter than the test specimens. When a peak reading is obtained, the stop screw may be installed at a point which will engage the pin in the rotated specimen holder. Installation of a stop screw is not essential if the specimen holder is rotated for each specimen and all readings are taken at peak of meter swing.

Remove the master specimen from the holder, place a clean blank piece of the same type of filter paper in the holder, and reinsert into the instrument. By means of the blanking controls (BLK), adjust the instrument so that the meter reads zero. Replace the blank filter paper with the master specimen and reinsert into the instrument. Using the standard control (STD), set the instrument so that all readings will be taken in the upper 2/3 of the meter range, and then remove the master specimen. Place the remaining specimens in the holder, one at a time, read each specimen on one side only, and record the results. The five reference specimens and the five test specimens should be read alternately to compensate for instrument drift. After all readings have been recorded, average the readings of the specimens. Compare the average of the test specimens with the average of the reference specimens to determine conformance to the brightness requirements of 4.4.

4.5 Fluorescent Stability: Material shall be capable of meeting the following requirements: After reading the specimens for brightness as in 4.4.3, they shall be exposed to black light which is defined as the in- ø visible radiant energy in that portion of the spectrum just beyond the blue of the visible spectrum, having a wave length of between 3200 and 4000 Angstrom units. The intensity of the light shall be between 90 - 150 ft-candles, in the center of the beam, approximately 15 in. from the specimen to be tested, when measured using an unfiltered Weston #703 illumination meter or equivalent. After the specimens are exposed to black light for 1 hr, they shall be read again on the equipment used in 4.4.3 to determine any loss in brightness. Prior to measuring the exposed specimens, the equipment shall be restandardized, using the unexposed master specimen. The fluorescent stability of the exposed specimens shall be not less than 95% of the same unexposed specimens.

4.6 Corrosion Test: The corrosion test shall be conducted at 122 F ± 2 (50 C ± 1.1), as described in ø ASTM D130 except as follows:

4.6.1 Test Specimens: Shall be made from aluminum alloy conforming to AMS 4045, magnesium alloy con- ø forming to AMS 4375, and steel conforming to AMS 6350.

4.6.2 Procedure: After exposing a specimen of each material listed in 4.6.1 in a sample of the penetrant to ø be evaluated, subsequent visual examination of each type of specimen shall reveal no evidence of etching, pitting, or corrosion product. Tarnishing shall be no greater than that found by conducting similar tests using tap water.

4.7 Storage Stability: A closed, filled container of each penetrant submitted for qualification shall be cap- ø able of being stored at a temperature of 60 - 100 F (15.6 - 37.8 C) for one year. At the end of the storage period the material shall be capable of meeting all requirements of this specification.