SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3155E

Issued 1958-08
Revised 1983-07
Noncurrent 1999-08
Cancelled 2008-12

Superseding AMS3155D

Oil Fluorescent Penetrant Solvent Soluble

RATIONALE

AMS3155E has been designated cancelled and superseded since equivalent technical requirements are contained in AMS2644.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of December 2008 and has been superseded by AMS2644. The requirements of the latest issue of AMS2644 shall be fulfilled whenever reference is made to the cancelled AMS3155. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS2644.

Cancelled specifications are available from SAE.

PREPARED BY AMS COMMITTEE “K”

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3155D

Issued AUG 1958
Revised JUL 1983
Noncurrent AUG 1999

Superseding AMS 3155C

Oil, Fluorescent Penetrant Solvent-Soluble

NONCURRENT NOTICE

This specification has been declared “NONCURRENT” by the Aerospace Materials Division, SAE, as of August 1999. 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 Form:

This specification covers a petroleum-base material in the form of a fluorescent, solvent-soluble oil.

1.2 Application:

Primarily for use in fluorescent penetrant inspection of parts and assemblies for detection of surface discontinuities and imperfections.

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 3160	Solvent, Petroleum
AMS 4045	Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (7075; -T6 Sheet, -T651 Plate)
AMS 4375	Magnesium Alloy Sheet and Plate, 3.0Al - 1.0Zn (AZ31B-0)
AMS 6350	Steel Sheet, Strip, and Plate, 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)

2.2 ASTM Publications:

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

ASTM D93	Flash Point by Pensky-Martens Closed Tester
ASTM D130	Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test
ASTM D270	Sampling Petroleum and Petroleum Products
ASTM D445	Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D1298	Density, Specific Gravity, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-290 Packaging, Packing and Marking of Petroleum and Related Products

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall consist of oil or oil-like components together with dye or other additives necessary to provide a hydrocarbon-solvent-soluble, highly penetrating, fluorescent penetrant solution having the properties specified in 3.2.

3.2 Properties:

Oil shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified test methods:

3.2.1 Flash Point: Shall be not lower than 150°F (65°C), determined in accordance with ASTM D93.

3.2.2 Toxicity: The oil shall contain material of not more than low toxicity. The penetrant shall not generate discomforting or injurious vapors when used under normal operating conditions.

3.2.3 Solvent Solubility: Shall be such that the droplets produced when 1 or 2 drops of the penetrant are dropped into a beaker (250 - 400 mL) containing AMS 3160 petroleum solvent at room temperature shall disperse immediately, leaving only a smoky appearance in the solvent.

3.2.4 Corrosiveness: Specimens of AMS 4045 aluminum alloy, AMS 4375 magnesium alloy, and AMS 6350 low-alloy steel shall reveal no evidence of etching, pitting, or corrosion products after being exposed to a sample of the penetrant solution at 122°F ± 2 (50°C ± 1) in accordance with the test procedure of ASTM D130. Tarnishing shall be no greater than that found by conducting similar tests using tap water.

3.2.5 Deviations from Initial Approval: After initial approval of a vendor's product, subsequent shipments shall not deviate from the original characteristics in excess of the percentage listed for each of the following properties:

3.2.5.1 Gravity, deg API: ±5%, determined in accordance with ASTM D1298.

3.2.5.2 Kinematic Viscosity at 100°F (38°C), Centistokes: ±10%, determined in accordance with ASTM D445.

3.2.5.3 Fluorescent Brightness: Shall be not less than 85% of that determined on the original penetrant on which source approval was granted, determined in accordance with 4.5.1. Other test methods may be used when agreed upon by purchaser and vendor.

3.2.5.4 Fluorescent Stability: After reading the specimens for brightness as in 4.5.1.3 they shall be exposed to long wave ultraviolet (black light), defined as the invisible 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 (3.2 - 4.0 x 10 nm). The intensity of the light shall be 510 - 850 μW/cm^2 in the center of the beam approximately 15 in. (380 mm) from the specimen to be tested when measured using an unfiltered illumination meter (See 8.3). After specimens are exposed to black light for 60 min. ± 5, they shall be read again on the equipment used in 4.5.1.3 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 specimen shall be not less than 90% of the unexposed specimens.

3.2.6 Storage Stability: A closed, filled container of penetrant shall meet the requirements of 3.2.1 through 3.2.5 after being stored for one year at 60° - 100°F (15° - 40°C).

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for flash point (3.2.1), corrosiveness (3.2.4), and fluorescent stability (3.2.5.4) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for toxicity (3.2.2) and solvent solubility (3.2.3) are classified as 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 to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed on the initial shipment of penetrant 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.

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

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4.3 Sampling:

Shall be in accordance with ASTM D270, unless otherwise specified; a lot shall be all penetrant 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. A lot may be packaged in smaller quantities and delivered separately under the basic lot approval provided the lot identity is maintained.

4.4 Approval:

4.4.1 Sample penetrant shall be approved by purchaser before penetrant for production use is supplied, unless such approval be waived by purchaser. Results of tests on production penetrant shall be essentially equivalent to those on the approved sample and shall not deviate in excess of limits specified in 3.2.5.

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production penetrant which are essentially the same as those used on the approved sample penetrant. if necessary to make any change in ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material or processing, or both, and, when requested, sample penetrant. Production penetrant made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Fluorescent Brightness:

4.5.1.1 Test Apparatus: Shall be a photoelectric photofluorometer (Coleman #12C, Turner 110 or 111, or equivalent), equipped with a UV transmitting, visible-light-absorbing primary filter (Corning 7-39 or equivalent) which has been sandblasted on the face toward the sample, a secondary filter (Corning 3-132 or equivalent), and reflectance sample holder.

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4.5.1.2 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 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 min. ± 0.5 in a preheated oven at 225°F ± 5 (107°C ± 3. Six paper specimens shall be prepared for the reference sample and five for the test material.

4.5.1.3 Test Procedure:

4.5.1.3.1 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 peak reading on the meter will be near 50. Adjust the reading to near 100 if the reference specimen appeared to be brighter than the test specimen. 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.

4.5.1.3.2 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 two-thirds 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 3.2.5.3.

4.6 Reports:

The vendor of the penetrant shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the acceptance test requirements and, when performed, to the periodic test requirements and, when performed, to the periodic test requirements and stating that the penetrant conforms to the other technical requirements of this specification. This report shall include the purchase order number, lot number, AMS 3155C, vendor's material designation, date of manufacture, and quantity.