

**METRIC**

**MIL-PRF-38299E**

**16 November 2011**

**SUPERSEDING**

**MIL-PRF-38299D**

**29 December 2006**

**PERFORMANCE SPECIFICATION**

**FLUID, PURGING, FOR PRESERVING FUEL TANKS  
OF JET AIRCRAFT**



Comments, suggestions, or questions on this document should be addressed to AFPA/PTPT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB OH 45433-7632 or e-mailed to [AFPET.AFTT@wpafb.af.mil](mailto:AFPET.AFTT@wpafb.af.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil>.

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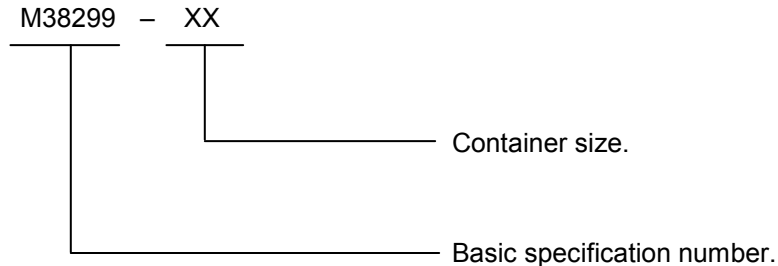
This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers the requirements for a fluid for use in purging and preserving fuel tanks of jet aircraft before hanging of aircraft for scheduled maintenance.

1.2 Part or identifying number (PIN). The PIN number is created as shown below. It serves to identify a product during procurement and also in the Federal Supply System.

Example:



## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### FEDERAL STANDARDS

FED-STD-313	Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government Activities
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#### DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133	Turbine Fuel, Aviation, Kerosene Type, JP-8 (NATO F-34), NATO F-35, and JP8 + 100 (NATO F-37)

(Copies of these documents are available online at <https://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Bldg 4D, Philadelphia PA 19111-5094.)

2.3 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

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## ASTM INTERNATIONAL (ASTM)

ASTM D86	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure (DoD adopted)
ASTM D93	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester (DoD adopted)
ASTM D130	Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test (DoD adopted)
ASTM D156	Standard Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method) (DoD adopted)
ASTM D240	Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (DoD adopted)
ASTM D381	Standard Test Method for Gum Content in Fuels by Jet Evaporation (DoD adopted)
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity) (DoD adopted)
ASTM D1266	Standard Test Method for Sulfur in Petroleum Products (Lamp Method) (DoD adopted)
ASTM D1298	Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method (DoD adopted)
ASTM D1319	Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption (DoD adopted)
ASTM D2276	Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling (DoD adopted)
ASTM D2386	Standard Test Method for Freezing Point of Aviation Fuels (DoD adopted)
ASTM D2624	Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels (DoD adopted)
ASTM D3227	Standard Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method) (DoD adopted)
ASTM D3242	Standard Test Method for Acidity in Aviation Turbine Fuel (DoD adopted)
ASTM D3338	Standard Test Method for Estimation of Net Heat of Combustion of Aviation Fuels (DoD Adopted)
ASTM D4052	Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter (DoD Adopted)

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ASTM D4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products (DoD adopted)
ASTM D4294	Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-Ray Fluorescence Spectrometry (DoD Adopted)
ASTM D4308	Standard Test Method for Electrical Conductivity of Liquid Hydrocarbons by Precision Meter (DoD adopted)
ASTM D4809	Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method) (DoD Adopted)
ASTM D4952	Standard Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test) (DoD adopted)
ASTM D5452	Standard Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration (DoD Adopted)
ASTM D5453	Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
ASTM D5972	Standard Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method) (DoD Adopted)
ASTM E29	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications (DoD adopted)

(Copies of these documents are available online at <http://www.astm.org> or from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken PA 19428-2959)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Materials. The purging fluid shall consist completely of hydrocarbon compounds except as specified herein. Virgin, recycled or reclaimed petroleum may be used.

3.2 Chemical and Physical Requirements. The product shall conform to the requirements as specified in Table I. Requirements in Table I are absolute and not subject to correction for tolerance of test methods. However, if multiple determinations are made, those results falling within the tolerance of the test method shall be averaged.

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**TABLE I. Chemical and physical requirements and test methods.**

REQUIREMENTS	Minimum	Maximum	ASTM Test Method
Distillation: °C (°F) Initial Boiling Point Recovered 10% <sup>1</sup> Recovered 50% <sup>1</sup> Recovered 90% <sup>1</sup> End Point Residue, vol % Loss, vol %	218 (425)	316 (600) 2.0 1.5	D86
Specific Gravity, 60°F/60°F <sup>1</sup>			D1298 or D4052 <sup>2</sup>
Total Sulfur, mass %		0.4	D1266, D4294 <sup>2</sup> , or D5453
Mercaptan Sulfur, mass % <sup>3</sup>		0.001	D3227
Existent Gum, mg/100 mL, washed		7 <sup>4</sup>	D381
Freezing Point, °C (°F)		-40 (-40)	D2386 <sup>2</sup> or D5972
Net Heat of Combustion, MJ/kg (BTU/lb)	41.9 (18,000)		D240, D3338, or D4809 <sup>2</sup>
Viscosity, mm <sup>2</sup> /s @ 38°C (100°F)		5.0	D445
Aromatics, vol %		15.0	D1319
Flash Point, °C (°F)	93 (200)		D93
Copper Strip Corrosion, 2 hr @ 100°C (212°F)	1b		D130
Particulate Matter, mg/L		1.0	D2276 or D5452 <sup>2</sup>
Total Acid Number, mg KOH/g		0.015	D3242
Color, Saybolt	+20		D156
Fuel electrical conductivity, pS/m, allowable range at ambient temperature or 29°C (85°F), whichever is lower	200	600	D2624 <sup>2</sup> or D4308

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**TABLE I. Chemical and physical requirements and test methods - Continued**

Miscibility with MIL-DTL-5624 (JP-5) and MIL-DTL-83133 (JP-8)	Completely miscible <sup>5</sup>		
<p>Notes:</p> <ol style="list-style-type: none"> <li>1. To be reported, not limited.</li> <li>2. Referee method.</li> <li>3. The Mercaptan sulfur determination may be waived at the option of the inspector if the fluid is "doctor sweet" when tested in accordance with ASTM D4952.</li> <li>4. The steam jet procedure for aircraft turbine fuel, in accordance with ASTM D381, shall be used. However, following the determination of the unwashed existent gum, the residue shall be extracted with n-heptane and the washed gum determined in accordance with ASTM D381 procedure for motor gasolines. Both unwashed and washed existent gum results shall be reported.</li> <li>5. Product shall be miscible in all concentrations with JP-5 and JP-8. No gums, sludge, or insoluble material shall be formed.</li> </ol>			

3.3 Workmanship. The purging fluid shall be free from undissolved water, sediment, suspended matter, and shall be clear and bright.

3.4 Antioxidants. Immediately after processing and before the product is exposed to the atmosphere (such as during rundown into feed/batch tankage), add an approved antioxidant formulation (3.4.1) or combination of approved antioxidant formulations in order to prevent the formation of gums and peroxides after manufacture. The concentration of antioxidant to be added shall be:

a. Not less than 17.2 milligrams (mg) nor more than 24.0 mg of active ingredient per liter (L) to products that contain blending stocks that have been hydrogen treated.

b. At the option of the supplier, not more than 24.0 mg of active ingredient per liter may be added to products that do not contain hydrogen treated blending stocks.

3.4.1 Antioxidant formulations. The following antioxidant formulations are approved:

- a. 2,6-di-tert-butyl-4-methylphenol
- b. 6-tert-butyl-2,4-dimethylphenol
- c. 2,6-di-tert-butylphenol
- d. 75 percent min-2,6-di-tert-butylphenol  
25 percent max tert-butylphenols and tri-tert-butylphenols
- e. 72 percent min 6-tert-butyl-2,4-dimethylphenol  
28 percent max tert-butyl-methylphenols and tert-butyl-dimethylphenols
- f. 55 percent min 2,4-dimethyl-6-tert-butylphenol and  
15 percent min 2,6-di-tert-butyl-4-methylphenol and  
30 percent max mixed methyl and dimethyl tert-butylphenols

3.5 Electrical conductivity additive. An electrical conductivity additive shall be added to the purging fluid in sufficient concentration to increase the conductivity of the fluid to within the range of 200 to 600 picosiemens per meter (pS/m). The following electrical conductivity additive is approved: Stadis® 450 marketed by Innospec Fuel Specialties LLC (formerly Octel Starreon LLC), Newark, DE 19702.

3.6 Toxicity. The finished purging fluid shall have no adverse effect on the health of personnel when used for its intended purpose. The fluid shall contain no components which produce noxious vapors in such concentrations that would cause physical irritation to personnel during use or formulation

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under conditions of adequate ventilation.

3.7 Limiting Values. The following applies to all specified limits in this performance specification: For the purposes of determining conformance with these requirements, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specification limit according to the Rounding Method of ASTM E29.

3.8 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

## 4. VERIFICATION

4.1 Points of inspection. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements (examination and test) as specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.2 Conformance inspection. Inspections of individual lots will serve as a basis for acceptance and shall consist of all the examinations and tests specified in section 3. Use the chemical and physical requirements and applicable test methods as specified in Table I for conformance testing.

### 4.3 Lot definitions.

a. Bulk Lot of Material. An indefinite quantity of a homogeneous mixture of material contained in one isolated tank or kettle which is greater than 55 gallons in size, or a quantity manufactured by a single plant run through the same processing equipment during one continuous operation not exceeding a 24-hour period.

b. Packaged Lot of Material. A container lot of material shall be defined as an indefinite number of 55-gallon drums or smaller unit containers of identical size and type, filled with a homogeneous mixture of material manufactured by a single plant run through the same processing equipment during one continuous operation not exceeding a 24-hour period.

4.4 Sample. Each sample shall be of sufficient size to conduct all the quality conformance tests as specified herein. Unless otherwise specified, the quality conformance tests shall be performed on each required sample.

4.5 Sampling. Sampling shall be in accordance with ASTM D4057.

4.6 Government requested sample. When requested, a 1-gallon sample shall be forwarded to the laboratory designated by the procuring activity for testing as specified herein.

4.7 Rejection. Failure of any purging fluid sample to conform to any of the specification requirements shall be cause for rejection of the lot represented.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

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6.1 Intended use. The purging fluid covered by this specification is intended for use in purging and preserving fuel tanks of Military jet aircraft before hanging and conducting maintenance operations. The fluid allows the Military to safely perform aircraft maintenance quickly under austere operating conditions. Exercise caution to avoid prolonged contact with the skin and observe Occupational Safety and Health Administration (OSHA) guidelines. Questions pertaining to the toxic effects should be referred to the appropriate departmental medical service.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Facility where Government requested test sample should be sent.
- c. Quantity required, and size and type of containers required.
- d. Packaging requirements (see 5.1).
- e. Any special marking required.

6.3 Material Safety Data Sheets. Contracting officers will identify those activities that require copies of completed Material Safety Data Sheets (MSDS) prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.4 Subject term (key word) listing.

Petroleum fluid  
Preservation fluid  
Antioxidant

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

## CONCLUDING MATERIAL

### Custodians:

Air Force – 68  
Army – AV  
Navy – AS  
DLA – GS

### Preparing activity:

Air Force – 68  
(Project 6850-2011-008)

### Review activities:

Air Force – 11

Note: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information using the ASSIST Online database at <https://assist.daps.dla.mil>.