

METRIC

MIL-DTL-83133L
W/AMENDMENT 1
14 March 2025

SUPERSEDING
MIL-DTL-83133L
02 August 2024

DETAIL SPECIFICATION

TURBINE FUEL, AVIATION, KEROSENE TYPE, JP-8 (NATO F-34) AND NATO F-35

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

1. SCOPE

1.1 Scope. This specification covers two grades of kerosene type aviation turbine fuel, JP-8 ([NATO F-34](#)) and [NATO F-35](#). Synthesized hydrocarbons from sources other than those listed in [3.2](#) require specific guidance that is outside the scope of MIL-DTL-83133. This guidance is found in ASTM D1655 Annex A1 (co-processing) and ASTM D7566 Annexes (synthetic blending components).

Comments, suggestions, or questions on this document should be addressed to AFPET/PTPS, 2430 C Street, Building 70, Area B, Wright-Patterson AFB, OH 45433 or e-mailed to AFPET.PTPS@us.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.dla.mil .
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1.2 Classification. Aviation turbine fuel will be of the following grades, as specified (see [6.2](#)).

Grade	NATO Code No.	Description
JP-8	F-34	Kerosene-type turbine fuel that will contain a static dissipater additive, corrosion inhibitor/lubricity improver, and fuel system icing inhibitor, and may contain antioxidant and metal deactivator additives.
---	F-35	Kerosene-type turbine fuel that will contain a static dissipater additive, may contain antioxidant, corrosion inhibitor/lubricity improver, and metal deactivator additives but will not contain fuel system icing inhibitor.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections [3](#) and [4](#) 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](#) and [4](#) 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-791 - Testing Method of Lubricants, Liquid Fuels, and Related Products

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-85470 - Inhibitor, Icing, Fuel System, High Flash
NATO Code Number S-1745

MIL-PRF-25017 - Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble
(NATO S-1747)

DEPARTMENT OF DEFENSE STANDARDS

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

QUALIFIED PRODUCTS LIST

- QPL-25017 - Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble (NATO S-1747)

(Copies of these documents are available online at <https://quicksearch.dla.mil>.)

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.

ASTM INTERNATIONAL

- ASTM D56 - Standard Test Method for Flash Point by Tag Closed Cup Tester
- ASTM D86 - Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
- ASTM D93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- ASTM D130 - Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- ASTM D156 - Standard Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)
- ASTM D381 - Standard Test Method for Gum Content in Fuels by Jet Evaporation
- ASTM D445 - Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- ASTM D976 - Standard Test Method for Calculated Cetane Index of Distillate Fuels
- ASTM D1298 - Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- ASTM D1319 - Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption

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ASTM D1322	- Standard Test Method for Smoke Point of Kerosene and Aviation Turbine Fuel
ASTM D1655	- Standard Specification for Aviation Turbine Fuels
ASTM D1840	- Standard Test Method for Naphthalene Hydrocarbons in Aviation Turbine Fuels by Ultraviolet Spectrophotometry
ASTM D2276	- Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling
ASTM D2386	- Standard Test Method for Freezing Point of Aviation Fuels
ASTM D2622	- Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry
ASTM D2624	- Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels
ASTM D2887	- Standard Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography
ASTM D3227	- Standard Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)
ASTM D3241	- Standard Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels
ASTM D3242	- Standard Test Method for Acidity in Aviation Turbine Fuel
ASTM D3338 / D3338M	- Standard Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
ASTM D3343	- Standard Test Method for Estimation of Hydrogen Content of Aviation Fuels
ASTM D3701	- Standard Test Method for Hydrogen Content of Aviation Turbine Fuels by Low Resolution Nuclear Magnetic Resonance Spectrometry
ASTM D3828	- Standard Test Methods for Flash Point by Small Scale Closed Cup Tester
ASTM D3948	- Standard Test Method for Determining Water Separation Characteristics of Aviation Turbine Fuels by Portable Separometer
ASTM D4052	- Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

ASTM D4057	- Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D4176	- Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)
ASTM D4177	- Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
ASTM D4294	- Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry
ASTM D4306	- Standard Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination
ASTM D4529	- Standard Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
ASTM D4737	- Standard Test Method for Calculated Cetane Index by Four Variable Equation
ASTM D4809	- Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)
ASTM D4952	- Standard Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)
ASTM D5006	- Standard Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
ASTM D5291	- Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants
ASTM D5452	- Standard Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration
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)
ASTM D6045	- Standard Test Method for Color of Petroleum Products by the Automatic Tristimulus Method

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ASTM D6379	- Standard Test Method for Determination of Aromatic Hydrocarbon Types in Aviation Fuels and Petroleum Distillates—High Performance Liquid Chromatography Method with Refractive Index Detection
ASTM D6751	- Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels
ASTM D6890	- Standard Test Method for Determination of Ignition Delay and Derived Cetane Number (DCN) of Diesel Fuel Oils by Combustion in a Constant Volume Chamber
ASTM D6986	- Standard Test Method for Free Water, Particulate and Other Contamination in Aviation Fuels (Visual Inspection Procedures)
ASTM D7039	- Standard Test Method for Sulfur in Gasoline, Diesel Fuel, Jet Fuel, Kerosine, Biodiesel, Biodiesel Blends, and Gasoline-Ethanol Blends by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry
ASTM D7042	- Standard Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)
ASTM D7153	- Standard Test Method for Freezing Point of Aviation Fuels (Automatic Laser Method)
ASTM D7154	- Standard Test Method for Freezing Point of Aviation Fuels (Automatic Fiber Optical Method)
ASTM D7171	- Standard Test Method for Hydrogen Content of Middle Distillate Petroleum Products by Low-Resolution Pulsed Nuclear Magnetic Resonance Spectroscopy
ASTM D7224	- Standard Test Method for Determining Water Separation Characteristics of Kerosine-Type Aviation Turbine Fuels Containing Additives by Portable Separometer
ASTM D7236	- Standard Test Method for Flash Point by Small Scale Closed Cup Tester (Ramp Method)
ASTM D7345	- Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure (Micro Distillation Method)
ASTM D7566	- Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons

ASTM D7619	- Standard Test Method for Sizing and Counting Particles in Light and Middle Distillate Fuels, by Automatic Particle Counter
ASTM D7668	- Standard Test Method for Determination of Derived Cetane Number (DCN) of Diesel Fuel Oils - Ignition Delay and Combustion Delay Using a Constant Volume Combustion Constant Chamber Method
ASTM D7777	- Standard Test Method for Density, Relative Density, or API Gravity of Liquid Petroleum by Portable Digital Density Meter
ASTM D7797	- Standard Test Method for Determination of the Fatty Acid Methyl Esters Content of Aviation Turbine Fuel Using Flow Analysis by Fourier Transform Infrared Spectroscopy – Rapid Screening Method
ASTM D7945	- Standard Test Method for Determination of Dynamic Viscosity and Derived Kinematic Viscosity of Liquids by Constant Pressure Viscometer
ASTM D8267	- Standard Test Method for Determination of Total Aromatic, Monoaromatic and Diaromatic Content of Aviation Turbine Fuels Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV)
ASTM D8305	- Standard Test Method for The Determination of Total Aromatic Hydrocarbons and Total Polynuclear Aromatic Hydrocarbons in Aviation Turbine Fuels and other Kerosene Range Fuels by Supercritical Fluid Chromatography
ASTM E29	- Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

(Copies of these documents are available from <https://www.astm.org>.)

ENERGY INSTITUTE

IP 12	- Determination of specific energy
IP 16	- Determination of the freezing point of aviation fuels - Manual method
IP 71 (Section 1)	- Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity

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IP 123	- Petroleum products - Determination of distillation characteristics at atmospheric pressure
IP 154	- Petroleum products - Corrosiveness to copper - Copper strip test
IP 156	- Determination of hydrocarbon types in petroleum products - Fluorescent indicator adsorption method
IP 160	- Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method
IP 170	- Determination of flash point - Abel closed-cup method
IP 216	- Determination of particulate contaminant of aviation turbine fuels by line sampling
IP 274	- Determination of electrical conductivity of aviation and distillate fuels
IP 323	- Determination of thermal oxidation stability of gas turbine fuels
IP 336	- Petroleum products - Determination of sulfur content - Energy-dispersive-X-ray fluorescence method
IP 342	- Petroleum products – Determination of thiol (mercaptan) sulfur in light and middle distillate fuels – Potentiometric method
IP 354	- Determination of the acid number of aviation turbine fuels – Colour-indicator titration method
IP 365	- Crude petroleum and petroleum products – Determination of density – Oscillating U-tube method
IP 406	- Petroleum products – Determination of boiling range distribution by gas chromatography
IP 423	- Determination of particulate contaminant in aviation turbine fuels by laboratory filtration
IP 424	- Determination of fuel system icing inhibitor content of aviation turbine kerosines by high performance liquid chromatography
IP 435	- Determination of the freezing point of aviation turbine fuels by the automatic phase transition method
IP 436	- Determination of aromatic hydrocarbon types in aviation fuels and petroleum distillates – High performance liquid chromatography method with refractive index detection

IP 528	- Determination of the freezing point of aviation turbine fuels – Automated fibre optic method
IP 529	- Determination of the freezing point of aviation fuels – Automatic laser method
IP 534	- Determination of flash point – Small scale closed cup ramp method
IP 540	- Determination of the existent gum content of aviation turbine fuel – Jet evaporation method
IP 565	- Determination of the level of cleanliness of aviation turbine fuel – Portable automatic particle counter method
IP 577	- Determination of the level of cleanliness of aviation turbine fuel – Automatic particle counter method using light extinction
IP 583	- Determination of the fatty acid methyl esters content of aviation turbine fuel using flow analysis by Fourier transform infrared spectroscopy – Rapid screening method
IP 585	- Determination of fatty acid methyl esters (FAME), derived from bio-diesel fuel, in aviation turbine fuel – GC-MS with selective ion monitoring/scan detection method
IP 590	- Determination of fatty acid methyl esters (FAME) in aviation turbine fuel – HPLC evaporative light scattering detector method
IP 598	- Petroleum Products – Determination of the smoke point of kerosine, manual and automated method
IP 599	- Determination of Fatty Acid Methyl Esters (FAME) in aviation turbine fuel – Gas Chromatography using heart-cut and refocusing

(Copies of these documents are available from <https://energyinst.org/technical/publications>.)

EUROPEAN COMMITTEE FOR STANDARDIZATION

EN 14214	- Liquid petroleum products – Fatty acid methyl esters (FAME) for use in diesel engines and heating applications – Requirements and test methods
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(Copies of this document are available from <https://www.cencenelec.eu>.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

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| ISO 4406 | - Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles |
| ISO 11171 | - Hydraulic fluid power - Calibration of automatic particle counters for liquids |

(Copies of these documents are available from <https://www.iso.org>.)

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 Requirements for NATO F-35. Except where indicated in sections [3](#) and [4](#), the requirements for [NATO F-35](#) are the same as for JP-8. Exceptions include:

- Additization with Corrosion Inhibitor/Lubricity Improver additive (CI/LI). Per [3.5.4](#), the CI/LI additive is optional for [NATO F-35](#) unless stated in the contract.
- Additization with Fuel System Icing Inhibitor (FSII). Per [3.5.5](#), FSII shall not be added to [NATO F-35](#) unless so directed by the purchasing authority.
- The total acid number requirement is kept at maximum 0.015 mg KOH/g.

3.2 Materials. Aviation turbine fuel is a complex mixture of hydrocarbons that varies depending on crude source and manufacturing process. JP-8 supplied under this specification shall be refined hydrocarbon distillate fuel oils, which contain additives in accordance with [3.5](#). Unless the feedstock is as specified in [3.3](#), the feedstock shall be crude oils, natural gas liquid condensates, heavy oil, petroleum, oil sands, oil shale, or mixtures thereof.

3.3 Synthesized hydrocarbons. The fuel supplied under this specification may contain Co-Hydroprocessed Synthesized Kerosene consistent with specific subsections in Annex A1.2.2 (Co-processing) of ASTM D1655 (see [3.3.1](#)) or synthetic blending components meeting the requirements of specific annexes in ASTM D7566 (see [3.3.2](#)).

3.3.1 Co-Hydroprocessed Synthesized Kerosene. Hydrocarbons in the kerosene boiling range derived from non-petroleum feedstocks that have been processed simultaneously (co-processing) with hydrocarbons from conventional sources as defined in ASTM D1655 Annex A1.2.2 (Co-processing) are permitted in the manufacture of JP-8. The co-hydroprocessed synthesized kerosene shall be produced from the feedstocks specified in Sections [3.3.1.1](#) and [3.3.1.2](#) and shall not exceed the concentration stated in these sections. The finished fuel shall conform to the requirements listed in Tables [I](#), [II](#), [III](#), and [V](#) of this specification and contain additives in accordance with [3.5](#).

3.3.1.1 Co-processing of mono-, di-, and triglycerides, free fatty acids, and fatty acid esters with conventionally sourced hydrocarbons as defined in ASTM D1655 Annex A1.2.2.1 is acceptable for the manufacture of JP-8. The process streams used for jet fuel production in co-processing refinery units shall not exceed 5 volume percent mono-, di-, and triglycerides, free

fatty acids, and fatty acid esters in feedstock volume with the balance (≥ 95 volume percent) being conventionally sourced hydrocarbons. Co-processing shall include hydrocracking or hydrotreating and fractionation. Processing may also include other conventional refinery processes. The finished fuel is limited to 5 volume percent co-hydroprocessed synthesized kerosene derived from mono-, di-, and triglycerides, free fatty acids, and fatty acid esters.

3.3.1.2 Co-processing of hydrocarbons derived from synthesis gas via the Fischer-Tropsch (FT) process using iron or cobalt catalyst with conventionally sourced hydrocarbons as defined in ASTM D1655 Annex A1.2.2.2 is acceptable for the manufacture of JP-8. The process streams used for jet fuel production in co-processing refinery units shall not exceed 5 volume percent FT hydrocarbons in feedstock volume with the balance (≥ 95 volume percent) being conventionally sourced hydrocarbons. Co-processing shall include hydrocracking and fractionation. Processing may also include other conventional refinery processes. The finished fuel is limited to 5 volume percent co-hydroprocessed synthesized kerosene derived from FT feedstock.

3.3.2 Synthetic blending components. Synthetic blending components are synthetic hydrocarbons that are derived from alternative sources not listed in [3.2](#). These include coal, natural gas, biomass, fatty acid esters and fatty acids, and hydrogenated fats and oils by processes such as gasification, Fischer-Tropsch synthesis, hydrothermal conversion, and hydroprocessing. Of the synthetic blending components approved in ASTM D7566, only those listed in [3.3.2.1](#) to [3.3.2.6](#) are approved in this specification. The finished fuel shall conform to the requirements listed in Tables [I](#), [II](#), [IV](#), and [V](#) of this specification and contain additives in accordance with [3.5](#).

3.3.2.1 Fischer-Tropsch Hydroprocessed Synthesized Paraffinic Kerosene (FT-SPK). A maximum of 50 volume percent of the finished fuel may consist of FT-SPK synthetic blending components. FT-SPK shall be comprised of hydroprocessed synthesized paraffinic kerosene wholly derived from paraffins and olefins produced from synthesis gas via the FT process using Iron or Cobalt catalyst. The FT-SPK synthetic blending components shall conform to the requirements in ASTM D7566 Annex A1.

3.3.2.2 Synthesized Paraffinic Kerosene From Hydroprocessed Esters and Fatty Acids (HEFA-SPK). A maximum of 50 volume percent of the finished fuel may consist of HEFA-SPK synthetic blending components. HEFA-SPK shall be comprised of hydroprocessed synthesized paraffinic kerosene wholly derived from hydrogenation and deoxygenation of fatty acid esters and free fatty acids. The HEFA-SPK synthetic blending components shall conform to the requirements in ASTM D7566 Annex A2.

3.3.2.3 Synthesized Iso-Paraffins From Hydroprocessed Fermented Sugars (SIP). A maximum of 10 volume percent of the finished fuel may consist of SIP synthetic blending components derived from hydroprocessed fermented sugars. SIP blend components shall be comprised of hydroprocessed synthesized iso-paraffins (farnesane) wholly derived from farnesene produced from fermentable sugars. The SIP synthetic blending components shall conform to the requirements in ASTM D7566 Annex A3.

3.3.2.4 FT Synthesized Paraffinic Kerosene Plus Aromatics (SPK/A). A maximum of 50 volume percent of the finished fuel may consist of SPK/A synthetic blending components. SPK/A blend components shall be comprised of FT-SPK as defined in section [3.3.2.1](#) combined with synthesized aromatics from the alkylation of non-petroleum derived light aromatics

(primarily benzene). The SPK/A synthetic blending components shall conform to the requirements in ASTM D7566 Annex A4.

3.3.2.5 Alcohol-To-Jet Synthetic Paraffinic Kerosene (ATJ-SPK). A maximum of 50 volume percent of the finished fuel may consist of ATJ-SPK synthetic blending components derived from ethanol; all other alcohol feedstocks such as isobutanol and isobutene are not approved. The ATJ-SPK synthetic blending components shall conform to the requirements in ASTM D7566 Annex A5.

3.3.2.6 Synthesized Paraffinic Kerosene From Hydroprocessed Hydrocarbons, Esters, and Fatty Acids (HC-HEFA). A maximum of 10 volume percent of the finished fuel may consist of HC-HEFA synthetic blending components derived from hydrogenation and deoxygenation of bio-derived hydrocarbons, fatty acid esters, and free fatty acids; the only approved bio-source is the *Botryococcus braunii* species of algae. HC-HEFA shall be comprised of hydroprocessed synthesized paraffinic kerosene. The HC-HEFA synthetic blending components shall conform to the requirements in ASTM D7566 Annex A7.

3.4 Finished fuel. Finished fuels shall meet all the requirements of this specification.

3.5 Additives. The type and amount of each additive used shall be made available when requested by procuring activity or user (see [6.2.d](#)). The only additives approved for use are those referenced in this specification.

3.5.1 Antioxidants. Immediately after processing and before the fuel is exposed to the atmosphere (such as during rundown into feed/batch tankage), add an approved antioxidant formulation (see [3.5.1.1](#)) 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) of fuel (6.0 to 8.4 lb/1000 barrels) to all JP-8 fuels that contain blending stocks that have been hydrogen treated or synthesized hydrocarbons (see [3.3](#)).

b. At the option of the supplier, not more than 24.0 mg of active ingredient per liter of fuel (8.4 lb/1000 barrels) may be added to JP-8 fuels that do not contain hydrogen treated blending stocks or synthesized hydrocarbons (see [3.3](#)).

3.5.1.1 Antioxidant formulations. The following antioxidant formulations are approved:

- a. 2,6-ditertiary-butyl-4-methyl-phenol
- b. 2,4-dimethyl-6-tertiary-butyl-phenol
- c. 2,6-di-tertiary-butyl-phenol
- d. 75 percent minimum 2,6-di-tertiary-butyl-phenol
25 percent maximum tertiary and tri-tertiary butyl-phenols
- e. 72 percent minimum 6-tertiary-butyl-2,4-dimethyl-phenol
28 percent maximum mixture of tertiary-butyl-methyl-phenols and
tertiary-butyl-dimethyl-phenols
- f. 55 percent minimum 2,4-dimethyl-6-tertiary-butyl-phenol, and
15 percent minimum 2,6-di-tertiary-butyl-4-methyl-phenol, and
30 percent maximum mixed methyl and dimethyl tertiary-butyl-phenols

3.5.2 Metal Deactivator Additive (MDA). MDA, N,N'-disalicylidene-1,2-propane diamine, shall not be used in JP-8 unless the supplier has obtained written consent from the procuring activity and user. The concentration of active material used on initial batching of the fuel at the refinery shall not exceed 2.0 mg/L. Cumulative addition of MDA when re-doping the fuel shall not exceed 5.7 mg/L. The final concentration of MDA in the fuel shall be reported.

3.5.3 Static Dissipater Additive (SDA). An additive shall be blended into the fuel in sufficient concentration to increase the conductivity of the fuel to within the range specified in [Table I](#) at the point of injection. The point of injection of the additive shall be determined by agreement between the purchasing authority and the supplier. The following SDA, also referred to as electrical conductivity additives or antistatic additives, are approved: Stadis® 450 manufactured by Innospec Fuel Specialties, LLC and AvGuard® SDA manufactured by Afton Chemical Corporation.

3.5.4 Corrosion Inhibitor/Lubricity Improver additive (CI/LI). A CI/LI additive meeting the requirements of MIL-PRF-25017 and approved in Qualified Products List (QPL)-25017 shall be blended into JP-8 ([NATO F-34](#)) by the contractor. The CI/LI additive is optional for [NATO F-35](#), unless stated in the contract. The amount added shall be equal to or greater than the minimum effective concentration and shall not exceed the maximum allowable concentration listed in QPL-25017. The contractor or transporting agency, or both, shall maintain and upon request shall make available to the Government evidence that the CI/LI additives used are approved in QPL-25017. The point of injection of the CI/LI additive shall be determined by agreement between the purchasing authority and the supplier.

3.5.5 Fuel System Icing Inhibitor (FSII). The use of FSII meeting the requirements of MIL-DTL-85470 and at a concentration per [Table I](#) shall be mandatory for JP-8. The point of injection of the additive for JP-8 shall be determined by agreement between the purchasing authority and the supplier. FSII shall not be added to [NATO F-35](#) unless so directed by the purchasing authority.

3.5.6 Premixing of additives. Additives shall not be premixed with other additives before injection into the fuel to prevent possible reactions among the concentrated forms of different additives.

3.6 Minimum finished fuel chemical and physical property requirements. The chemical and physical properties of all finished fuels shall meet the requirements specified in [Table I](#) when tested in accordance with the specified test methods. Refer to [3.7](#) for additional chemical and physical property requirements for fuels containing co-hydroprocessed synthesized hydrocarbons (see [3.3.1](#)) or synthetic blending components (see [3.3.2](#)). The minimum microseparator rating of all finished fuels is dependent on the additives present (see [Table II](#)). At the time of Government acceptance, the concentration of incidental contaminants in all finished fuels shall be within [Table V](#) limits.

TABLE I. Chemical and physical requirements and test methods.

Property	Requirement	Test Methods	
		Referee	Alternative
WORKMANSHIP	Pass	Section 3.8	---
COMPOSITION			
Color, Saybolt	Report	D156	D6045
Total acid number, mg KOH/g	for JP-8: max 0.10 for F-35: max 0.015	D3242 / IP 354	---
Aromatics, volume percent	max 25.0	D1319 1	IP 156, D8267, or D8305 2
	max 26.5		D6379 / IP 436
Sulfur, total, mass percent	max 0.30	D4294	D2622, D5453, D7039 3 , or IP 336
Sulfur, mercaptan, mass percent or Doctor test 4	max 0.003	D3227 / IP 342	---
	negative	D4952	
VOLATILITY			
Distillation temperature, °C 5		D86 6	D2887 / IP 406, IP 123, or D7345 7
Initial boiling point (IBP)	Report		
10 percent recovered	max 205		
20 percent recovered	Report		
50 percent recovered	Report		
90 percent recovered	Report		
Final boiling point (FBP)	max 300		
Residue, volume percent	max 1.5		
Loss, volume percent	max 1.5		
Flash point, °C 8	min 38	D93	D56, D3828, D7236 / IP 534, or IP 170
Density Density, kg/L, at 15 °C, or Gravity, API, at 60 °F	0.775 to 0.840 37.0 to 51.0	D4052	D1298 / IP 160, IP 365, or D7777
FLUIDITY			
Freezing point, °C	max -47	D2386 / IP 16	D5972 / IP 435, D7153 / IP 529, or D7154 / IP 528
Viscosity, at -20 °C, mm ² /s	max 8.0	D445 / IP 71 Section 1	D7042 9 or D7945

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TABLE I. Chemical and physical requirements and test methods (Continued).

Property	Requirement	Test Methods	
		Referee	Alternative
COMBUSTION			
Net heat of combustion, MJ/kg	min 42.8	D4809	D3338/D3338M, D4529, or IP 12
Hydrogen content, mass percent	min 13.4	D7171	D3343, D3701, or D5291
Smoke point, mm or Smoke point, mm, and Naphthalenes, volume percent	min 25.0 min 19.0 max 3.0	D1322 / IP 598 D1322 / IP 598 D1840	--- D8305 10
Cetane index 11	report	D976	D4737
CORROSION			
Copper strip corrosion, 2 hr at 100 °C (212 °F)	max No. 1	D130 / IP 154	---
THERMAL STABILITY			
Thermal stability (2.5 hr at 260 °C) 12 , 13		D3241 / IP 323	---
Change in pressure drop, mm Hg	max 25		
Heater tube rating: One of the following requirements shall be met:			
(1) Annex A3 ETR, Annex A2 ITR, or Annex A4 MWETR, average deposit thickness, nm, over area of 2.5 mm ²	max 85		
or			
(2) Annex A1 VTR	<3 (no Peacock (P) or Abnormal (A) color deposits)		
ADDITIVES (see 3.5)			
Antioxidant (AO), mg/L	17 to 24 (see 3.5.1)	---	---
Metal Deactivator Additive (MDA), mg/L (per written consent)	max 2.0 (initial) max 5.7 (cumulative) (see 3.5.2)	---	---
Static Dissipater Additive (SDA) 14 Fuel electrical conductivity, pS/m	50 to 600 (see 3.5.3)	D2624 / IP 274	---
Corrosion Inhibitor/Lubricity Improver additive (CI/LI)	Additive-specific dosage listed in QPL-25017 (see 3.5.4)	---	---
Fuel System Icing Inhibitor (FSII), volume percent	0.07 to 0.10 (see 3.5.5)	D5006	IP 424

TABLE I. Chemical and physical requirements and test methods (Continued).

Property		Requirement	Test Methods	
			Referee	Alternative
CONTAMINANTS				
Existent gum, mg/100 mL 15		max 7	D381	IP 540
Microseparometer Rating		16	D7224	D3948
NOTES:				
1.	The following fluorescent indicator dyed gel lots shall not be used to report aromatics results by ASTM D1319 or IP 156: 3000000975, 3000000976, 3000000977, 3000000978, 3000000979, and 3000000980.			
2.	Results for aromatics content by ASTM D8305 shall be corrected for bias using the bias-correction equation for aromatics in the Precision and Bias section of D8305.			
3.	The total sulfur content detection range for ASTM D7039 is 3.2 mg/kg to 2822 mg/kg.			
4.	If the Doctor Test results in a failure ('positive' result), then mercaptan sulfur content shall be determined by the referee test method ASTM D3227.			
5.	Distillation property criteria are specified in ASTM D86 / IP 123 scale units. ASTM D2887 or IP 406 results shall be converted to estimated D86 / IP 123 results by application of the correlation in Appendix X4 "Correlation for Jet and Diesel Fuel (Procedures A and B)" of D2887 or Annex G "Calculation of IP 123 equivalent distillation data" of IP 406 for comparison with the specified property criteria. Distillation residue and loss limits provide control of the distillation process during the D86 / IP 123 test methods and do not apply to D2887.			
6.	ASTM D86 distillation is run at Group 4 conditions except that Group 3 condenser temperatures are used.			
7.	Results for distillation by ASTM D7345 shall be corrected to bias using the applicable bias-correction in the Precision and Bias section of D7345.			
8.	Relative to ASTM D93, results obtained by Test Method: D56 can be up to 1.5 °C lower, D3828 can be up to up to 2 °C lower, IP 170 can be up to 1.0 °C lower, and D7236 (IP 534) can be up to 1.0 °C lower.			
9.	Results for viscosity at -20 °C by ASTM D7042 shall be corrected for bias using the bias-correction equation for jet fuel at -20 °C in the Precision and Bias section of D7042.			
10.	Results for naphthalenes content by ASTM D8305 shall be corrected for bias using the bias-correction equation for naphthalenes in the Precision and Bias section of D8305.			
11.	Should the JP-8 or NATO F-35 contain synthetic blending components, cetane index shall not be reported. Instead, derived cetane number (DCN) shall be reported. Refer to Table IV .			
12.	ASTM D3241 Annex A3 Ellipsometric Tube Rater (ETR) shall be the referee thermal stability method, when available; otherwise, Annex A2 Interferometric Tube Rater (ITR), or Annex A4 Multi Wavelength Ellipsometric Tube Rater (MWETR), when available. If the ITR reports "N/A" for the tube's volume measurement, the result constitutes a failure and the result shall be reported as ">85 nm." If test results by ETR, ITR, or MWETR are reported, then results by D3241 Annex A1 Visual Tube Rater (VTR) are not required.			

TABLE I. Chemical and physical requirements and test methods (Continued).

NOTES:	
13.	Thermal stability results by ASTM D3241 / IP 323 obtained using a 230 Mk IV instrument containing an inline internal non-consumable fuel filter located upstream of the 0.45 µm pre-filter shall not be approved for JP-8.
14.	Allowed SDA concentrations: (a) On initial blending: maximum 3 mg/L (b) After field reblending, cumulative concentration: maximum 5 mg/L
15.	The preferred vaporizing medium for aviation turbine fuel is steam; however, the existent gum test IP 540 may be performed using air as the vaporizing medium. If air is used instead of steam, it shall be recorded. Test Method ASTM D381, using steam jet operating conditions, shall be the referee test method.
16.	Contract requirements shall dictate which fuel additives are to be in the fuel and, in turn, the determination of which Microseparometer (MSEP) rating applies along with which MSEP test method to use per Table II . If the jet fuel is fully additized with all the approved fuel additives including SDA, then ASTM D7224 shall be run; otherwise, ASTM D3948 shall be run.

TABLE II. Microseparometer (MSEP) rating.

JP-8 Additives	MSEP Rating, minimum	Test Method
Antioxidant (AO) ¹ , Metal Deactivator (MDA) ¹ , or no additives	90	ASTM D3948 ²
AO ¹ , MDA ¹ , and Fuel System Icing Inhibitor (FSII)	85	
AO ¹ , MDA ¹ , and Corrosion Inhibitor/Lubricity Improver (CI/LI)	80	
AO ¹ , MDA ¹ , FSII, and CI/LI	70	
SDA (may contain AO ¹ , MDA ¹)	70	
FSII, CI/LI, and SDA (may contain AO ¹ , MDA ¹)	70	ASTM D7224 ³
NOTES:		
1.	Even though the presence or absence of AO and MDA do not change the MSEP limits using D3948, samples submitted for specification or conformance testing shall contain the same additives present in the refinery batch. Regardless of which minimum the refiner selects to meet, the refiner shall report the MSEP rating on a laboratory hand blend of the fuel with all additives required by the specification.	
2.	The MSEP rating using ASTM D3948 applies to a JP-8 additized with FSII and/or CI/LI that may also contain AO and/or MDA. If the JP-8 contains both CI/LI and SDA, then ASTM D7224 shall be the MSEP test method used.	
3.	The MSEP rating using ASTM D7224 solely applies to a fully additized JP-8 (containing FSII, CI/LI, and SDA; the fuel may also contain AO and MDA).	

3.7 Additional requirements for finished fuels containing synthesized hydrocarbons. Finished fuels containing synthesized hydrocarbons (see [3.3](#)) shall meet the additional requirements specified in [Table III](#) (additional requirements for JP-8 containing co-hydroprocessed synthesized kerosene per [3.3.1](#)) or [Table IV](#) (additional requirements for JP-8 containing synthetic blending components per [3.3.2](#)), when tested in accordance with the specified test methods.

TABLE III. Additional requirements of JP-8 containing co-hydroprocessed synthesized kerosene (see [3.3.1](#)).

Property	Requirement	Test Methods	
		Referee	Alternative
FLUIDITY			
Freezing point, °C	max -47	D5972 / IP 435	D7153 / IP 529 or D7154 / IP 528
Viscosity, at -40 °C, mm ² /s	max 12.0	D445 / IP 71 Section 1	D7945 or D7042 ¹
THERMAL STABILITY			
Thermal stability (2.5 hr at 280 °C) ^{2, 3}		D3241 / IP 323	---
Change in pressure drop, mm Hg	max 25		
Tube rating: One of the following requirements shall be met:			
(1) Annex A3 ETR, Annex A2 ITR, or Annex A4 MWETR, average deposit thickness, nm, over area of 2.5 mm ²	max 85		
or			
(2) Annex A1 VTR	<3 (no Peacock (P) or Abnormal (A) color deposits)		
CONTAMINANTS			
Unconverted esters and fatty acids, mg/kg ⁴	max 15	D7797 / IP 583	---
NOTES:			
1.	The procedure for temperature scanning specified in ASTM D7042 shall be used.		
2.	ASTM D3241 Annex A3 Ellipsometric Tube Rater (ETR) shall be the referee thermal stability method, when available; otherwise, Annex A2 Interferometric Tube Rater (ITR), or Annex A4 Multi Wavelength Ellipsometric Tube Rater (MWETR), when available. If the ITR reports "N/A" for the tube's volume measurement, the result constitutes a failure and the result shall be reported as ">85 nm." If test results by ETR, ITR, or MWETR are reported, then results by D3241 Annex A1 Visual Tube Rater (VTR) are not required.		

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TABLE III. Additional requirements of JP-8 containing co-hydroprocessed synthesized kerosene (see 3.3.1) (Continued).

NOTES:	
3.	Thermal stability results by ASTM D3241 / IP 323 obtained using a 230 Mk IV instrument containing an inline internal non-consumable fuel filter located upstream of the 0.45 µm pre-filter shall not be approved for JP-8.
4.	Only applicable to JP-8 produced from co-processing of mono-, di-, and triglycerides, free fatty acids, and fatty acid esters with conventionally sourced hydrocarbons (see 3.3.1.1) at point of manufacture.

TABLE IV. Additional requirements of JP-8 containing synthetic blending components (see 3.3.2).

Property	Requirement	Test Methods	
		Referee	Referee
COMPOSITION			
Aromatics, volume percent	min 8.0	D1319 ¹	IP 156, D8267, or D8305 ²
	min 8.4		D6379 / IP 436
VOLATILITY			
Distillation °C ³		D86 ⁴	D2887 / IP 406, D7345 ⁵ , or IP 123
50 percent recovery gradient ⁶	min 15		
90 percent recovery gradient ⁷	min 40		
FLUIDITY			
Viscosity, at -40 °C, mm ² /s	max 12.0	D445 / IP 71 Section 1	D7945 or D7042 ⁸
COMBUSTION			
Derived cetane number	min 40.0	D6890	D7668
NOTES:			
1.	The following fluorescent indicator dyed gel lots shall not be used to report aromatics results by ASTM D1319 or IP 156: 3000000975, 3000000976, 3000000977, 3000000978, 3000000979, and 3000000980.		
2.	Results for aromatics content by ASTM D8305 shall be corrected for bias using the bias-correction equation for aromatics in the Precision and Bias section of D8305.		

TABLE IV. Additional requirements of JP-8 containing synthetic blending components (see 3.3.2) (Continued).

NOTES:	
3.	Distillation property criteria are specified in ASTM D86 / IP 123 scale units. ASTM D2887 or IP 406 results shall be converted to estimated D86 / IP 123 results by application of the correlation in Appendix X4 "Correlation for Jet and Diesel Fuel (Procedures A and B)" of D2887 or Annex G "Calculation of IP 123 equivalent distillation data" of IP 406 for comparison with the specified property criteria. Distillation residue and loss limits provide control of the distillation process during the D86 / IP 123 test methods and do not apply to D2887.
4.	ASTM D86 distillation is run at Group 4 conditions except that Group 3 condenser temperatures are used.
5.	Results for distillation by ASTM D7345 shall be corrected for bias using the applicable bias-correction equations in the Precision and Bias section of D7345.
6.	The temperature difference between the temperature that demarks the 10 percent recovered point and the temperature that demarks the 50 percent recovered point shall be at least 15 °C.
7.	The temperature difference between the temperature that demarks the 10 percent recovered point and the temperature that demarks the 90 percent recovered point shall be at least 40 °C.
8.	The procedure for temperature scanning specified in ASTM D7042 shall be used.

3.8 Workmanship. The finished fuel shall be visually free from undissolved water, sediment, or suspended matter and shall be clear and bright. Refer to ASTM D6986, Procedure A (Clear, Transparent Containers), which is the referee procedure, or ASTM D4176 Procedure 1 or Procedure 2. In case of dispute, the fuel shall be clear and bright at 21 °C (70 °F) and shall contain less than 1.0 mg/L of particulate matter as required in [Table V](#).

3.9 Incidental contaminants. At the time of Government acceptance, the concentration of incidental contaminants in the finished fuel shall not exceed the limits in [Table V](#). For a definition of incidental contaminants, see [6.4.7](#).

TABLE V. Incidental contaminants.

Material	Limits		ASTM or IP Test Method	
	Minimum	Maximum	Referee	Alternative
FUEL CLEANLINESS ¹				
Particulate matter (gravimetric), mg/L		1.0	D5452 / IP 423	D2276 / IP 216
Filtration time, minutes ²		15	Section 4.4	
Particle counting, individual channel counts & ISO Code ³	Channel Counts	ISO Code ⁴	D7619 / IP 565	IP 577
≥ 4 μm(c) ⁵	Report	max 19		
≥ 6 μm(c) ⁵	Report	max 17		
≥ 14 μm(c) ⁵	Report	max 14		
≥ 30 μm(c) ⁵	Report	max 13		
OTHER INCIDENTAL CONTAMINANTS				
	Minimum	Maximum	Referee	Alternative
Fatty Acid Methyl Ester (FAME) ⁶ , mg/kg		50	IP 585	D7797 / IP 583, IP 590, or IP 599
NOTES:				
1.	For Fuel Cleanliness, either the particulate matter (gravimetric) or particle counting shall be run. Of the two procedures, particulate matter (gravimetric) shall be the referee. Should particle counting be run and it results in a failure, then particulate matter (gravimetric) shall be run and reported.			
2.	If filtration time is required by contract, the procedure contained in 4.4 shall be used.			
3.	Alternate to the gravimetric particulate matter test method where equipment and laboratory capability exist. Should particulate counting result in failure, gravimetric particulate matter shall be run.			
4.	Per Table 1 "Allocation of scale numbers" of ISO 4406.			
5.	The notation (c) indicates that the equipment has been calibrated in accordance with ISO 11171.			
6.	For a definition of FAME, see 6.4.8 . The recent mandatory and voluntary introduction of FAME in the commercial middle distillate marketplace has resulted in the potential for trace amounts of FAME in JP-8 fuel. Fuel supplied under this specification shall not intentionally be blended with FAME. Where a risk exists for incidental FAME contamination, the supplier shall ensure this limit is not exceeded prior to product availability. FAME that fails to meet the biodiesel quality standards (ASTM D6751 or EN 14214) are not permitted in aviation turbine fuel.			

3.10 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased 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 Conformance inspection. Conformance inspection shall consist of all examinations, inspections, and tests of this specification.

4.1.1 Inspection lot. For conformance inspection, individual lots shall be examined, inspected, and tested as specified herein to ensure individual lots meet all the requirements specified in section [3](#).

4.1.2 Sampling plans.

4.1.2.1 Sampling for conformance inspection. Each bulk or packaged lot (see [6.4](#)) of material shall be sampled in accordance with ASTM D4057 or ASTM D4177 except where individual test procedures contain specific sampling instructions.

4.1.2.1.1 Sample containers. Examine the sample container for conformance to recommended sample container guidance found in ASTM D4306 (see [6.5](#)).

4.1.2.2 Sampling for examination of filled containers for delivery. A random sample of filled containers shall be selected from each lot. The samples shall be examined in accordance with [4.3.1.3](#). Any container with one or more defects under the required fill shall be rejected.

4.2 Inspection conditions. The finished fuel shall meet the limiting values in [Table I](#) using the specified test methods. In addition to meeting [Table I](#) requirements, finished fuels containing co-hydroprocessed synthesized hydrocarbons (see [3.3.1](#)) shall meet the additional requirements specified in [Table III](#) and finished fuels containing synthetic blending components (see [3.3.2](#)) shall meet the additional requirements specified in [Table IV](#).

4.3 Methods of inspection.

4.3.1 Examination of product.

4.3.1.1 Visual inspection. Samples selected in accordance with [4.1.1](#) shall be visually examined for compliance with [3.8](#).

4.3.1.2 Examination of empty containers. Prior to filling, each empty unit container shall be visually inspected for cleanliness and prepared for proper usage in accordance with ASTM D4057.

4.3.1.3 Examination of filled containers. Samples taken as specified in [4.1.2](#) shall be examined for conformance to MIL-STD-290 with regard to fill, closure, sealing, leakage, packaging, packing, and markings.

4.3.2 Chemical and physical tests. Tests to determine conformance to chemical and physical requirements shall be conducted in accordance with Tables [I](#), [II](#), and [V](#) for all finished fuels. Finished fuels containing co-hydroprocessed synthesized hydrocarbons ([3.3.1](#)) shall also meet the additional requirements specified in [Table III](#) and finished fuels containing synthetic blending components ([3.3.2](#)) shall also meet the additional requirements specified in [Table IV](#). Requirements contained in Tables [I](#), [II](#), [III](#), [IV](#), and [V](#) are not subject to corrections for test tolerances. If multiple determinations are made, results falling within any specified repeatability and reproducibility tolerances shall be averaged to determine conformance to the specified limit. The following applies to all specified limits in this specification: For purposes of determining conformance with this specification, an observed value or a calculated value shall be rounded "to

the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the Rounding Method of ASTM E29.

4.4 Filtration time. Method 7509 "Method for Determination of Filtration Time and Total Solids" in FED-STD-791 shall be run if filtration time is required by contract.

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.)

6.1 Intended use. The fuels covered by this specification are intended for use in aircraft turbine engines. JP-8 contains military-unique additives that are required by military weapon systems. This requirement is unique to military aircraft and engine designs. When authorized, JP-8 ([NATO F-34](#)) may be used in ground-based turbine and diesel engines. [NATO F-35](#) is intended for commercial aviation but can be converted to JP-8 ([NATO F-34](#)) by the addition of the appropriate additives.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, date of this specification, and grade (type) of fuel.
- b. Quantity required and size containers desired.
- c. Level of packaging and packing required (see [5.1](#)).
- d. Location and injection method for addition of electrical conductivity additive, fuel system icing inhibitor and corrosion inhibitor/lubricity improver, as required.
- e. Identification of type and concentration of synthetic material present in the fuel. As applicable, documentation certifying compliance of synthesized blending components with the appropriate ASTM D7566 annex requirements (see [3.3](#)).

6.3 Conversion of metric units. Units of measure have been converted to the International System of Units (SI) (Metric) in accordance with IEEE/ASTM SI10 *American National Standard for Metric Practice*. If test results are obtained in units other than metric or there is a requirement to report dual units, IEEE/ASTM SI10, should be used to convert the units.

6.4 Definitions.

6.4.1 Bulk lot. A bulk lot consists of an indefinite quantity of a homogeneous mixture of material offered for acceptance in a single isolated container or manufactured in a single plant run through the same processing equipment, with no change in ingredient material.

6.4.2 Packaged lot. A packaged lot consists of an indefinite number of 208-liter (55-gallon) drums, or smaller unit packages of identical size and type, offered for acceptance and filled from an isolated tank containing a homogeneous mixture of material; or filled with a homogeneous mixture of material run through the same processing equipment with no change in ingredient material.

6.4.3 Homogenous product. A homogeneous product is defined as a product where samples taken at various levels of the batch tank are tested for the defining homogeneous characteristics and all values obtained meet the repeatability precision requirements for that test method.

6.4.4 Synthesized Paraffinic Kerosene (SPK). Kerosene consisting of n-paraffins, iso-paraffins and cycloparaffins derived from non-petroleum sources.

6.4.5 Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene (FT-SPK). A synthetic blending component comprised of SPK produced from one or more precursors synthesized by Fischer-Tropsch processing. Typical catalysts used are iron- or cobalt-based.

6.4.6 Hydroprocessed Esters and Fatty Acids (HEFA) SPK. A synthetic blending component comprised of SPK produced by hydroprocessing fats, oils, and greases. HEFA SPK has also been called Hydroprocessed Renewable Jet or Hydrotreated Renewable Jet (HRJ) and, for the purpose of this specification, the terms are considered interchangeable.

6.4.7 Incidental contaminants. Known contaminants that can be picked up during fuel conveyance. These have defined upper allowable limits but are not identified as fuel additives. Examples include sediment (particulate) and FAME (biodiesel).

6.4.8 Fatty Acid Methyl Ester (FAME). FAME is the main constituent of biodiesel meeting the requirements of ASTM D6751 or EN 14214. Per ASTM D6751, biodiesel is a "fuel comprised of long chain fatty acids derived from vegetable oils or animal fats, designated B100." JP-8 can pick up trace amounts of FAME when transported through conveyance methods where diesel fuel containing biodiesel is also transported.

6.4.9 Static Dissipater Additive (SDA). Fuel additive that increases the electrical conductivity of the fuel. This is advantageous for electrical charge buildup dissipation encountered during fuel conveyance. Very low concentrations of the additive are needed; typically, maximum 3 mg/L (first additive doping) or maximum 5 mg/L (cumulative additive dosing). It is also referred to as electrical conductivity additive or antistatic additive.

6.4.10 Finished fuel. Final blend of a complex mixture of hydrocarbons, with additives, provided for specification acceptance.

6.4.11 Conventional blending component. Blending streams wholly derived from the following conventional sources: crude oil, natural gas liquid condensates, heavy oil, petroleum, oil sands, oil shale, or mixtures thereof.

6.4.12 Synthetic blending component. Blending streams derived from non-conventional sources meeting the requirements of section [3.3.2](#). Synthetic blending components must be combined with a conventional blending component prior to certification.

6.4.13 Co-Hydroprocessed Synthesized Kerosene. Hydrocarbons in the kerosene boiling range derived from non-petroleum sources such as coal, natural gas, biomass, fatty acid esters, and fatty acids by processes such as gasification, FT synthesis, and hydroprocessing that have been processed simultaneously with hydrocarbons from conventional sources. Refer to [3.3.1](#).

6.4.14 Synthesized Iso-Paraffins (SIP). A synthetic blending component comprised of primarily iso-paraffins (farnesane) that is produced by hydroprocessing and fractionation of farnesene derived from fermentation of sugars.

6.4.15 Fischer-Tropsch Synthesized Paraffinic Kerosene Plus Aromatics (SPK/A). A synthetic blending component comprised of SPK and synthesized aromatic compounds.

6.4.16 Alcohol-to-Jet Synthetic Paraffinic Kerosene (ATJ-SPK). A synthetic blending component comprised of SPK from alcohol via dehydration, oligomerization, hydrogenation, and fractionation processing steps.

6.4.17 Synthesized Paraffinic Kerosene From Hydroprocessed Hydrocarbons, Esters, and Fatty Acids (HC-HEFA). A synthetic blending component that is comprised of bio-derived hydrocarbons and free fatty acids and fatty acid esters that have been hydroprocessed to saturate the hydrocarbon molecules and remove essentially all oxygen.

6.4.18 CONUS. CONUS is an acronym for Contiguous United States, which includes the 48 US states in the continent of North America (that are south of Canada) plus the District of Columbia.

6.4.19 OCONUS. OCONUS is an acronym for Outside [the] Contiguous United States; i.e., Alaska, Hawaii, the US territories, and all other countries.

6.5 Sample containers. A number of jet fuel properties are very sensitive to trace contamination from sample containers. Refer to ASTM Practice D4306 for recommended sample containers.

6.6 Subject term (key word) listing.

Alcohol-to-jet synthetic paraffinic kerosene (ATJ-SPK)

Antioxidants

Biodiesel

Co-hydroprocessed synthesized paraffinic kerosene

Corrosion inhibitor / lubricity improver (CI/LI)

Fatty acid methyl ester (FAME)

Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene (FT-SPK)

Fischer-Tropsch synthesized paraffinic kerosene plus aromatics (SPK/A)

Flash point

Freezing point

Hydrocarbon distillate

Hydrogen content

Hydroprocessed esters and fatty acids (HEFA)
Hydroprocessed Renewable Jet / Hydrotreated Renewable Jet (HRJ)
Icing inhibitor
Static dissipater additive (SDA)
Synthesized iso-paraffins (SIP)
Synthesized paraffinic kerosene (SPK)
Synthesized paraffinic kerosene from hydroprocessed hydrocarbons, esters, and fatty acids (HC-HEFA)

6.7 International standardization agreement implementation. This specification implements:

- a. NATO STANAG / AFLP 1135 *Interchangeability of Fuels, Lubricants and Associated Products Used by the Armed Forces of the North Atlantic Treaty Nations.*
- b. NATO STANAG/AFLP 3747 *Guide Specifications (Minimum Quality Standards) for Aviation Turbine Fuels (F-24, F-34, F-35, F-37, F-40 and F-44).*
- c. Air Force Interoperability Council (AFIC) Air Standard Fuels, Lubricants and Gases Working Group (FLG) 4024, *Interchangeability Chart of Standardized Aviation Fuels, Lubricants, and Associated Products.*

When amendment, revision, or cancellation of this specification is proposed which will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.8 Safety data sheets (SDS). Contracting officers will identify those activities requiring copies of completed SDS prepared in accordance with FED-STD-313 *Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government Activities.* The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.9 Test report. Test data required by [4.3.2](#) should be available for the procurement activity and user in the same order as listed in [Table I](#). The Standard Form for Reporting Inspection Data on Aviation Turbine Fuels published in ASTM D1655 Appendix X3 (Forms for Reporting Inspection Data on Aviation Turbine Fuels) should be used as a guide. Also, the type and amount of additives used are to be reported.

6.10 Particulate requirement. Most of the JP-8 procured is in [OCONUS](#) as additized Jet A-1 meeting Defence Standard 91-091 *Turbine Fuel, Kerosene Type, Jet A-1; NATO Code: F-35; Joint Service Designation: AVTUR.* It should be noted that it is the intention of the Technical Authority (Preparing Activity for Defence Standard 91-091) to make particle counting the referee particulate method before the end of 2025. The particulate requirement for JP-8, for which gravimetric is the referee method, is in [Table V](#) (Incidental contaminants) of this specification.

6.11 AN-8. AN-8 is a DLA contract clause and product code used for the procurement of JP-8 for use in the Arctic and Antarctic regions. MIL-DTL-83133 is the base specification to which AN-8 is procured. The following are the differences in limits from those for JP-8:

- a. Freezing point (maximum minus 58 °C (minus 72 °F))
- b. Total sulfur content (maximum 15 mg/kg (15 ppm by mass))
- c. FSII (0.10 to 0.15 volume percent)

6.12 NATO F-24. F-24, which in recent years has been used in lieu of JP-8 in [CONUS](#), can be defined as “Product consisting of kerosene type aviation turbine fuel conforming to ASTM D1655, Type Jet A, containing the following additives: treated with 0.07-0.10% by volume FSII meeting MIL-DTL-85470, CI/LI meeting MIL-PRF-25017 and approved in QPL-25017, and SDA, Stadis 450 or AvGuard SDA, blended into the fuel in sufficient concentration to increase the conductivity of the fuel to between 50 and 600 pS/m at ambient temperature or 29 °C, whichever is lower, when tested in accordance with ASTM D2624. Stadis 450 is manufactured by Innospec Fuel Specialties, LLC. AvGuard SDA is manufactured by Afton Chemical Corporation.” F-24 is, in essence, ASTM D1655 Grade Jet A additized per the additization requirements for JP-8 in MIL-DTL-83133.

6.13 Aromatics content referee test method. It is the intent of the Preparing Activity to designate ASTM D6379 as the referee test method for the aromatics content requirement in the next revision of MIL-DTL-83133. ASTM D1319, which has been the referee test method since the base document was published in May 1976, will be kept as an alternative test method.

6.14 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

- a. The intent of this amendment is to address areas in MIL-DTL-83133L that came to the attention of the Preparing Activity after the publication of MIL-DTL-83133L. These include:
 - i. Section [3.5.1](#) (Antioxidants). Wording corrected to clarify under which conditions additization with antioxidants is mandatory.
 - ii. In [Table I](#):
 - a) Reworded [footnote 11](#) on cetane index.
 - b) Under Thermal Stability, inversed the order of metrological (ETR, ITR, MWETR) and visual (VTR) heater tube rating methods. ETR remains as the referee. Similar change also made in [Table III](#).
 - c) Under the subsection for [Additives](#):
 1. Added Antioxidant (AO) and Metal Deactivator Additive (MDA).
 2. Added Static Dissipater Additive (SDA). The row for SDA now includes both the conductivity requirement and also the allowable concentrations of SDA (mg/L) in the fuel (new [footnote 14](#)).

- iii. Section [4.1.2.2](#) (Sampling for examination of filled containers for delivery): The last sentence, which was included in previous MIL-DTL-83133 revisions, was re-added.
- iv. Reworded section [4.4](#) (Filtration time): Introduction of FED-STD-791 method 7509 "Method for Determination of Filtration Time and Total Solids."
- v. Re-added *Hydroprocessed Renewable Jet or Hydrotreated Renewable Jet (HRJ)* in sections [6.4.6](#) (Hydroprocessed Esters and Fatty Acids (HEFA) SPK) and [6.6](#) (Subject term (key word) listing). References to HRJ were included in previous MIL-DTL-83133 revisions.
- vi. Section 6.4 (Definitions):
 - a) Modified the definition for FAME in [6.4.8](#).
 - b) Corrected the maximum SDA concentration (first additive doping) in [6.4.9](#). It is consistent with new [footnote 13](#) (Allowed SDA concentrations) in [Table I](#).
 - c) Added new definitions for CONUS ([6.4.18](#)) and OCONUS ([6.4.19](#)).
- vii. Updated the definition for AN-8 in [6.11](#).
- viii. New section [6.12](#) (NATO F-24).
- ix. New section [6.13](#) (Aromatics content referee test method).
- x. Updated wording in [6.14.b.iv](#) on filtration time.
- b. Main changes in MIL-DTL-83133L: The intent of MIL-DTL-83133L is to harmonize it as much as possible with MIL-DTL-5624X *Turbine Fuel, Aviation, Grade JP-5 (NATO F-44)*.
 - i. Approval of synthesized hydrocarbons (see [3.3](#)).
 - a) Co-Hydroprocessed Synthesized Kerosene (see [3.3.1](#)). The Co-Hydroprocessed Synthesized Kerosenes approved in this revision are derived from ASTM D1655-22a Annex A1.2.2 (Co-processing), specifically A1.2.2.1 and A1.2.2.2 where the maximum co-hydroprocessed fractions in the jet fuel is 5 volume percent.
 - b) Synthetic blending components (see [3.3.2](#)). The following synthetic blending components have been approved in this revision:
ASTM D7566 Annexes A3, A4, A5 (ethanol-derived only), and A7.
 - 1. The synthetic blending components listed in ASTM D7566 Annexes A1 and A2 were previously approved in earlier MIL-DTL-83133 revisions (originally in MIL-DTL-83133F / MIL-DTL-83133H and later in MIL-DTL-83133K).
 - ii. Harmonization of JP-8 with ASTM D1655: As a follow-up of the US DoD having used NATO F-24 (ASTM D1655 Jet A additized per the requirements of this specification) since 2014 in [CONUS](#) in lieu of JP-8, the following three fuel

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requirements (total acid number, mercaptan sulfur, and fuel conductivity (minimum limit)) are being harmonized with those in ASTM D1655.

- a) Total acid number requirement for [NATO F-35](#): The total acid number requirement is kept at maximum 0.015 mg KOH/g to harmonize with Defence Standard 91-091 and NATO STANAG/AFLP 3747.
- iii. JP-8 containing thermal stability (+100) additive. All references to JP-8+100 (NATO F-37) and +100 additive (NATO S-1749) have been removed from MIL-DTL-83133 effective this revision MIL-DTL-83133L because none of the U.S. DoD Services use this fuel additive any longer.
- iv. Filtration time. Filtration time has been made optional unless required by contract effective this revision MIL-DTL-83133L as there are limited users at this time. Filtration time can be used to identify fuels containing ultra fine particulate matter. It has been requested, by one of the Services, to leave it in MIL-DTL-83133 as optional (e.g., to be performed as required by contract or on request; otherwise, filtration time is optional).
 - a) The filtration time procedure has been moved from Appendix A (in previous revision MIL-DTL-83133K) to section [4.4](#).

CONCLUDING MATERIAL

Custodians:

Army – AT
Navy – AS
Air Force – 68
DLA – PS

Preparing activity:

Air Force – 68
(Project 9130-2024-003)

Review activities:

Army – AR, AV
Air Force – 11, 20, 184

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.dla.mil>.