FUEL USERS GUIDE*
—2000—

Provides:

- **Fuel Definitions**
- **Fuel Requirements for Army Mobility Engines**
- **NATO Fuel Designation and U.S. Equivalent Specifications/Standards**

FUEL DEFINITIONS

Primary Fuel - A fuel that permits full design performance.

Alternate Fuel - A fuel that provides acceptable operational performance versus the Primary fuel, but may be a restricted item of supply in tactical areas or has environmental limitations. Performance shall not degrade below the vehicle/equipment minimum specification requirements. No degradation in reliability or durability will occur.

Emergency Fuel - A fuel used only when the Primary or Alternate fuel is not available. The use of an Emergency fuel shall not materially degrade the design operating life of the vehicle/equipment. Severe performance degradation is permissible when an Emergency fuel is used.

Referee Fuel - A fuel that fully conforms to all requirements within its parent specification but is so designed to maximize selected chemical and physical characteristics, resulting in a fuel that represents the lowest quality level procurable. Referee fuels are not intended for normal service use but are required in research, development, and materiel acquisition programs. These referee fuels are further described in fuel specification MIL-F-46162.

Alternative Fuel – A general term for any fuel other than conventionally refined gasoline and diesel fuel found in the commercial marketplace.

Acceptable Operational Performance - The level of performance that meets the minimum requirements as defined in the vehicle/equipment specification.

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* Abstracted from AR 70-12, Fuels and Lubricants Standardization Policy for Equipment Design, Operation, and Logistic Support, 1 May 1997.

Fuels Used in Army Materiel

Item	Primary Fuel	Alternate Fuel (See Note 1)	Emergency Fuel
Ground gasoline-consuming materiel:			
OCONUS environments	ASTM D 4814 (S-I Fuel) (See Note 2)	F-57 (Gasoline) F-67 (Gasoline) F-18 (AVGAS)	---
CONUS environments	ASTM D 4814 (S-I Fuel)	A-A-52530 (Gasohol) ASTM D 910 (100LL)	---
Ground diesel-consuming materiel:			
OCONUS environments	A-A-52557 (Diesel) (See Note 3)	MIL-DTL-83133 (JP-8), F-34 MIL-DTL-5624 (JP-5), F-44 MIL-F-16884, F-76* F-75 (Navy Distillate) ASTM D 1655 (Jet A-1), (See Note 4) F-65 (Diesel Blend) F-63 (Diesel Fuel)	ASTM D 4814 (S-I Fuel) F-57 (Gasoline) F-67 (Gasoline) F-18 (AVGAS) MIL-DTL-5624 (JP-4), F-40
CONUS environments	A-A-52557 (Diesel)	ASTM D 975 (Diesel) ASTM D 1655 (Jet A/Jet A-1) (See Note 4)	ASTM D 4814 (S-I Fuel) ASTM D 910 (100 LL) ASTM D 1655 (Jet B)
Aviation materiel:			
Gasoline-consuming	ASTM D 910 (100LL)	F-18 (AVGAS)	ASTM D 4814 (S-I Fuel)
Turbine-consuming	MIL-DTL-83133 (JP-8), F-34	MIL-DTL-5624 (JP-5), F-44 MIL-DTL-5624 (JP-4), F-40 ASTM D 1655 (Jet A/A-1) ASTM D 1655 (Jet B)	(See Note 5)

Notes:

1. Environmental conditions may limit use of certain alternate fuels designated with an asterisk (*)
2. ASTM D 4814 is a spark-ignition engine fuel (S-I fuel) that allows use of oxygenates for reducing CO exhaust emissions.
3. Although A-A-52557 is shown as the **primary fuel**, MIL-DTL-83133 (JP-8) or MIL-DTL-5624 (JP-5) will be used as the **primary fuel** in those theaters where the Single Fuel on the Battlefield is implemented in accordance with DOD Directive 4140.25 and U.S. ratification of STANAG 4362.
4. Jet A-1/F-35 or Jet A is acceptable for continuous use in cold to moderate temperature environments. For moderate to high temperature environments, Jet A-1, F-35, or Jet A are not recommended for continuous use with engines fitted with fuel-lubricated rotary injection pumps and should be replaced with JP-8/F-34.
5. Refer to applicable aircraft Operator's Manual.

NATO Fuel Designations and U.S. Equivalent Specification/Standards

NATO Code No.	NATO Title	Military/Federal Specification	Industry Equivalent Standard
F-18	Gasoline, Aviation, Grade 100/130	---	---
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F-57	Gasoline, Auto, Low lead (96 RON)	STANAG* 7090	---
F-67	Gasoline, Auto, Unleaded (95 RON)	STANAG 7090	CEN EN 228
---	---	ASTM D 4814 S-I* Engine Fuel	ASTM D 4814 S-I Engine Fuel
---	---	A-A*-52530 Gasohol	ASTM D 4814 S-I Engine Fuel
F-40	Turbine Fuel, Aviation, Widecut Type + FSII (S-1745)	MIL-DTL-5624 Turbine Fuel, Aviation, Grade JP-4	ASTM D 1655 Aviation Turbine Fuel, Jet B (w/o inhibitors)
F-34	Turbine Fuel, Aviation, Kerosene + FSII (S-1745)	MIL-DTL-83133 Turbine Fuel, Aviation, Grade JP-8	---
F-35	Turbine Fuel, Aviation, Kerosene	MIL-DTL-83133 Turbine Fuel, Aviation, Grade JP-8	ASTM D 1655 Aviation Turbine Fuel, Jet A-1
F-44	Turbine Fuel, Aviation, High-Flash Type + FSII (S-1745)	MIL-DTL-5624 Turbine Fuel, Aviation, Grade JP-5	---
F-54	Diesel Fuel, Military	---	---
F-58	Kerosene	---	ASTM D 3699, 1-K
F-63	Diesel Fuel	DCSEA 108, Issue 1	---
F-65	Low-Temperature Diesel Fuel Blend	50/50 F-54 with F-34/F-35	---
---	---	A-A-52557 Fuel Oil, Diesel Grades DL-1 & DL-2	ASTM D 975 Diesel Fuel, Grades Low Sulfur 1-D & 2-D
F-75	Fuel, Naval Distillate, Low Pour Point	---	---
F-76	Fuel, Naval Distillate	MIL-F-16884 Fuel, Naval Distillate	---
S-1745	FSII, High Flash Point Type	MIL-I-85470 Inhibitor, Icing, Fuel System, High Flash	ASTM D 4171 FSII, Type III

* **Abbreviations:**

CEN	Comite Europeen de Normalisation
RON	Research Octane Number
FSII	Fuel System Icing Inhibitor
STANAG	Standardization Agreement
DL-	Diesel Fuel, Low Sulfur
A-A	Commercial Item Description Prefix

Explanation of Fuel Types

JP-4 MIL-DTL-5624's Grade JP-4 interchanged under NATO code number F-40; contains over 50 percent gasoline fractions; **extremely volatile;** marginal to unsatisfactory cetane number quality.

JP-5 MIL-DTL-5624's Grade JP-5 interchanged under NATO code number F-44; contains only kerosene fractions; **not** considered volatile.

JP-8 MIL-DTL-83133 interchanged under NATO code number F-34; contains only kerosene fractions; not considered volatile. Identical to ASTM D 1655 Jet A-1, except Jet A-1 does not include fuel system icing inhibitor, corrosion inhibitor, or static dissipator additive, which are all mandatory under MIL-DTL-83133.

Jet A-1 Industry "standard" used worldwide by **all** commercial airlines. Has slightly lower freeze point requirement than Jet A (-47° vs. -40°C), interchanged under NATO code number F-35.

Jet A Industry standard used only by U.S. commercial airlines when operating within the U.S.

F-54 A-A-52557 to be interchanged under NATO code number F-54; **not** considered volatile.

Selected Typical Fuel Properties (Average Survey Data)

				CONUS		OCONUS
Property	JP-4/Jet B	JP-5	JP-8	DL-1	DL-2	F-54
Gravity, °API	54.6	42.2	43.5	42.3	34.2	38.5
Density, lb/gal	6.306	6.826	6.652	6.779	7.111	6.930
K. Viscosity at 40°C, cSt	0.56	1.5	1.2	1.6	2.8	3.0
Cetane No.	23	42	45	44	47	49
Sulfur, % mass	0.037	0.047	0.049	0.02	0.02	N/A
Cloud Point, °C	-63	-46	-47	-41	-12	-19
Reid Vapor Pressure, at 38°C, psi	2.6	<1	<1	<1	<1	<1
Distillation, °C						
IBP	59	180	157	174	190	176
10% Rec.	91	191	175	196	222	219
50% Rec.	137	215	200	219	265	265
90% Rec.	197	242	236	246	313	311
Flash Point, °C	-20	63.3	48.9	50	74	70
Heat of Combustion						
Net BTU/lb	18,732	18,456	18,490	18,581	18,451	18,423
Net BTU/gal	118,124	125,270	123,069	125,207	131,207	127,820

For more information, contact:
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