

**Notes to Table 5-1**

1. The flash point temperature is a safety-related property which must be established according to applicable local requirements.
2. The cloud point should be 10° F (6° C) below the lowest ambient temperature to prevent clogging of fuel filters by wax crystals.
3. The filter plugging point temperature should be equal to or below the lowest expected fuel temperature.
4. No free water visible.

**NOTE:**

When prolonged idling periods or cold weather conditions below 32 °F(0 °C) are encountered, the use of 1-D fuel is recommended. Note, however, that transit coach engines are emission certified on either No.1 or No.2 fuel. To maintain emission compliance, only the correct certified fuel should be used.

**5.1.1 FUEL LUBRICITY**

It is recommended that all fuels used in DDC engines meet the minimum lubricity requirements listed in Table 5-1, “Diesel Fuel Specifications.” Fuels not meeting the lubricity requirements may be additized to meet them.

**5.1.2 PREMIUM DIESEL FUEL**

Premium diesel fuels are not covered by any existing industry specification. It is recommended that the customer obtain additional information from the fuel marketer and compare properties to those listed in Table 5-1 before using.

**5.1.3 HEAVY FUELS NOT RECOMMENDED**

Heavy fuels intended for use in slow speed diesel engines and as burner fuel are not recommended for use in any Detroit Diesel engine. Marine fuels specified by ASTM D2609 are examples of such fuels. These fuels are known to cause combustion deposits and will likely reduce engine durability.

**5.1.4 BIODIESEL FUELS**

Biodiesel fuels are alkyl esters of long chain fatty acids derived from renewable resources. Biodiesel fuels must meet ASTM Specification D 6751. Biodiesel meeting the D 6751 specifications can be blended up to 20% maximum by volume in diesel fuel. The resulting mixture must meet the fuel properties listed in Table 5-1. Failures attributed to the use of biodiesel will not be covered by Detroit Diesel product warranty.

The following quotation is extracted from *World-Wide Fuel Charter – Draft for comments – June 2002, page 46* for reference and guidance:

“Based on the technical effects of FAME [Fatty Acid Methyl Esters], it is strongly advised that FAME content be restricted to less than 5%. As a pure fuel, or at higher levels in diesel fuel, the vehicles need to be adapted to the fuel, and particular care is needed to avoid problems.”

### 5.1.5 OTHER FUELS

Fuels listed in Table 5-2 and Table 5-3 have provided economic and availability advantages for some applications, particularly where No. 1 type fuels are required. These do not meet requirements listed in Table 5-1. Although not recommended, they have demonstrated acceptable performance in controlled applications.

Property	Jet A/A-1 D 1655	JP-5	JP-8 <sup>1</sup>	CONUS DF-1	CONUS DF-2	OCONUS DF-2
API Gravity, @ 60° F	44.3	41.1	45.6	42.3	34.2	38.5
Flash Point, °C	38	62	45	50	74	70
Viscosity, Kin., cSt @ 40° C	—	1.5	1.2	1.6	2.8	3.0
Cloud Point °C	-40	-46	-47	-41	-12	-19
Sulfur, % mass	0.3 Max.	0.4 Max.	0.4 Max.	0.05 Max.	0.05 Max.	0.3 Max.
Cetane Number	—	42	45	44	47	49
Distillation % Vol. Rec., °C						
—IBP	—	180	157	174	190	176
—10% Typical	205	191	175	196	222	219
—50% Typical	Report	215	200	219	265	365
—90% Max.	Report	242	236	246	313	311
Final Boiling Point, Max. Temp.	300	—	—	—	—	—
Heat Content, Btu/gal., Net	123, 608	125, 270	123, 069	125, 960	131, 207	127, 820

1. JP + 100 is not recommended in equipment with water-coalescing filters.

**Table 5-2 Selected Typical Fuel Properties**

Type	NATO Spec.	Mil. Spec	Application
JP-4	F-40	Mil-T-5624	Jet Fuel, Contains 50% Gasoline: Not Recommended
JP-5	F-44	Mil-T-5624	Jet Fuel, Kerosene Based
JP-8	F-34	Mil-T-83133	Jet A-1 with De-Icer and Corrosion Inhibitor
Jet A	None	None	Industry Standard Jet Fuel
Jet A-1	F-35	None	Jet Fuel, ASTM D 1655
DL-1/DL-2	F-54	W-F 800 CONUS	Specified Military Use Inside Continental U.S.
DA-2	F-54	W-F 800 OCONUS	Specified Military Use Outside Continental U.S.

**Table 5-3 Fuel Type Specifications and Applications**

Lower density fuels, such as those listed in Table 5-2 and Table 5-3 and “winter blended” diesel fuels, have a lower volumetric heat content than the standard No. 2 fuel listed in Table 5-1, “Diesel Fuel Specifications.” Operating with these fuels will result in reduced engine output and reduced fuel mileage, compared to standard No. 2 fuel. Reductions of 5% are not unusual and may be as high as 10%. A good rule of thumb is this: *The engine power is proportional to the heating value of the fuel.*

Lower density fuels also tend to have lower viscosity and poor lubrication characteristics. Fuel filtration should be changed to that recommended for “Severe Duty Service” to prevent potential injector seizure from dirt contamination of fuel.