
DETROIT™ BIODIESEL¹ POLICY:

ENGINE COMPATIBILITY:

DD13, DD15, DD16 engines: Biodiesel blends up to 5% are allowed. Biodiesel blends must meet the specifications listed in this document.

Series 60 Engines: Series 60 engines manufactured after 2004 are compatible with biodiesel blends up to 20%. It is not recommended to run blends higher than 5% on Series 60 engines manufactured prior to 2004, as they may contain materials that are not compatible with biodiesel². Biodiesel blends must meet the specifications listed in this document.

MBE900 / 4000 Engines: Biodiesel blends up to 5% are allowed. Biodiesel blends must meet the specifications listed in this document.

BIODIESEL FUEL QUALITY REQUIREMENTS³:

- Biodiesel blends up to 5% (B5) must meet the appropriate industry standards; ASTM D975, or CAN/GCSB- 3.520 at a minimum. Additionally, DETROIT™ has requirements above and beyond these specifications detailed in Table 1.
- ⁴Biodiesel blends from 6% to 20% (B6- B20) must meet the appropriate industry standards; ASTM D 7467 or CAN/GCSB-3.522 at a minimum. Additionally, DETROIT™ has requirements above and beyond these specifications detailed in Table 1.
- Biodiesel blendstocks (B100) must meet the appropriate industry standards; ASTM D6751, CAN/CGSB-3.524, or EN 14214 at a minimum. Additionally, DETROIT™ has requirements above and beyond these specifications detailed in Table 1.

¹ The term “biodiesel” refers specifically to Fatty Acid Methyl Esters or FAME made through the process of transesterification, as defined in ASTM D6751.

² Biodiesel is not compatible with certain sealing materials, such as nitrile and butyl rubber, or yellow metals, such as copper, bronze and brass, or lead, zinc or galvanized iron.

³ Requirements should be confirmed by fuel supplier; always monitor the Certificate of Analysis from each batch of fuel.

⁴ Requirements listed for Series 60 engines only.

Table 1: Supplemental Fuel Property Requirements for DETROIT™ Engines:

| Property | ASTM Test Method | ISO Test Method | Base Specifications: | Base Specifications: | Base Specifications: |
|--|---------------------|---------------------|--------------------------------|---------------------------------|---|
| | | | ASTM D975 or CAN/CGSB 3.520 | ASTM D7467 or CAN/CGSB 3.522 | ASTM D6751, CAN/CGSB 3.524, or EN 14214 |
| | | | #1 or #2 Diesel Fuel | B6- B20 Blends | B100 Blendstock |
| Biodiesel Content, % (V/V) | D7371 | EN 14103 | <5 | 6-20 | 100 |
| Water and Sediment, % vol, max | D 6304 | EN ISO 12937 | 200 | 200 | 200 |
| | D2276 | | 24 | 24 | 24 |
| Copper strip corrosion rating, max (3 h at a minimum control temperature of 50°C) | D 130 | EN ISO 2160 | No. 1 | No. 1 | No. 1 |
| | | | --- | --- | --- |
| Lubricity, HFRR @ 60°C, micron, max | D 6079 | EN ISO 12156-1 | 460 | 460 | --- |
| Conductivity, pS/m or Conductivity Units (C.U.), min | D 2624/D 4308 | | 25 | --- | --- |
| Acid Number, mg KOH/g, max | D664 / D974 | EN 14104 | 0.1 | 0.1 | 0.3 |
| Oxidation Stability, hours, min | EN 15751 / EN 14214 | EN 15751 / EN 14214 | 24 | 20 | 8 |
| Calcium and Magnesium, combined ppm | EN 14538 | EN 14538 | <1 | <1 | 2 |
| Sodium and Potassium, combined ppm | EN 14538 | EN 14538 | <1 | <1 | 1 |
| Free glycerin | D 6584 | EN 14105 | --- | --- | 0.02 (see below) |
| Total glycerin | D 6584 | EN 14105 | --- | --- | 0.24 (see below) |
| Glyceride Content | | | --- | --- | --- |
| | Mono | EN 14105 | --- | --- | 0.80% |
| | Di | EN 14105 | --- | --- | 0.20% |
| | Tri | EN 14105 | --- | --- | 0.20% |
| NACE Corrosion Test | | | B++ min | B++ min | --- |
| Water Coalescing Effectiveness, % minimum | D 7261 | - | 70 | 70 | --- |

WARRANTY IMPLICATIONS:

Detroit Diesel is not responsible for the cost of maintenance or repairs due to the lack of performance of required maintenance services or the failure to use fuel, oil, lubricants, and coolants meeting Detroit Diesel-recommended specifications. Performance of required maintenance and use of proper fuel, oil, lubricants, and coolants are the responsibility of the owner and any failures as a result of improper maintenance will not be covered by Detroit Diesel Warranty. For full details, see the engine operator's guide for your engine.

Using biodiesel blends does not automatically void Detroit Diesel's warranty. However, any failure of the engine or aftertreatment device that is determined to be caused by biodiesel blends not meeting the requirements documented in this publication will not be covered by Detroit Diesel warranty.

ADDITIONAL CAUTIONS:

Fuel Filter Plugging:

- Due to biodiesel's solvency, it can clean fuel systems and deposit debris on filters and lead to premature plugging immediately after switching to biodiesel.
- If running with biodiesel blends higher than 5%, fuel filters should be changed at ½ the recommended service intervals published in the engine owner's manual. This is due to accelerated filter plugging from glycerides.
- Fuel filter replacement is not to be covered under Detroit Diesel warranty. Detroit Diesel recommends the use of genuine Detroit Diesel fuel filters.

- Secondary fuel system hardware failure attributable to premature fuel filter plugging with biodiesel blends is not covered under Detroit Diesel warranty.

Storage & Oxidative Stability:

- Biodiesel blends are less stable than diesel fuel and should not be stored for more than 3 months
- Biodiesel blends are not suitable for applications involving low frequency use.
- Before parking an engine for an extended time period, the fuel system must be purged of all biodiesel blends and flushed with petroleum diesel fuel

Compatibility with Aftertreatment Systems:

- Biodiesel blends up to 20% are compatible with Detroit's aftertreatment devices provided that it meets all quality specifications listed above
- Biodiesel blends contaminated with phosphorus, alkali (Na and K) or alkaline (Ca and Mg) metals, not meeting the specification limits, may lead to premature poisoning and plugging of aftertreatment devices

Cold Weather Performance:

- Use of biodiesel blends above 5% are not recommended in colder regions.
- The cloud point and cold filter plugging point (CFPP) properties of the fuel on the certificate of analysis should be regularly monitored and compared to expected ambient temperature to be encountered in use⁴.
- Cold flow or anti-gel additives may respond differently to biodiesel blends; consult with the fuel supplier to determine actual performance

Water Contamination:

- Biodiesel is more friendly to water; it will not separate as easily
- Water separator efficiency is significantly reduced. More frequent changes of fuel coalescers may offset the reduced water separation efficiency.
- ASTM D7261 can be run to determine the fuel's water coalescing ability.
- Excessive water contamination may lead to corrosion in fuel system and promote microbe growth
- Fuel injection system failure due to corrosion caused by use of biodiesel fuel blends will not be covered by Detroit Diesel warranty.

Microorganism Growth:

- Biodiesel has an increased tendency for microbial growth
- Microbial contamination may cause premature fuel filter plugging and/or corrosion in the fuel system
- Laboratory testing for microbial growth is available. Fuel samples must be collected from the bottom of the tank (water layer) to accurately detect the microbes

⁴ Refer to ASTM D975 for tenth percentile minimum ambient air temperatures in the United States.

Engine Oil Analysis is Required:

- Using biodiesel blends may require reduced engine oil drain intervals
- Biodiesel may accelerate acid formation in the engine oil
- Biodiesel fuel dilution is very harmful to the engine oil and will not evaporate from the engine oil as easily as diesel fuel
- Biodiesel fuel dilution will reduce the oil viscosity and accelerate oil degradation, requiring reduced oil drain intervals
- Used oil analysis is required for the first few oil changes after converting to biodiesel blends to check for fuel dilution and to confirm the proper oil drain interval. Detroit Genuine Oil Analysis Program is recommended (p/n 23520989).