Introduction to Biodiesel

Renewable Fuels

Biodiesel is a diesel fuel produced by chemical refining of vegetable oils into “fatty acid methyl esters,” or FAME. Glycerin is removed in the refining process, lowering oil viscosity to match diesel fuel. Pure biodiesel is most often added to diesel fuel in a 2, 5, or 20% blend, and referred to as B2, B5, or B20 respectively.

Other renewable “biofuels” are raw oils or recycled greases that have not been transformed into biodiesel. These products require extra heat, filtration, and other vehicle modifications to burn in diesel engines.

Challenges and Solutions

Racor fuel filters and heaters are uniquely suited for filtering and conditioning biodiesel and biofuels for use in diesel engines.

Biodiesel tends to dissolve natural fuel “tar” deposit coating the inside of diesel tanks, piping, and hoses. Dissolved deposits are carried to fuel filters, causing shortened fuel filter life. Most biodiesels have a low “interfacial tension.” This means that water easily disperses and dissolves in fuel. Low interfacial tension greatly reduces water separation efficiency for all types of water separators and coalescers. Removal of water from a fuel system is necessary for proper engine performance.

Racor recommends using the largest filter practical for the application. A larger filter adds more filtration media surface area, which lowers flow velocity going to each square inch of media. This extends filter life and increases water removal efficiency. When specifying a new biodiesel fuel system, de-rate filter flow by 50% and install on the vacuum (suction) side of any pumps, where possible.

Pure biodiesel has high cloud and pour points, necessitating the use of electric and/or coolant heaters in cold weather. Higher percentage blends (B20) act more like standard diesel fuel, but some lower fuel blends have been known to cause problems. Other biofuels of raw oil or recycled grease have high viscosity as well as cloud and pour points, and must be heated to high temperatures to be used.

Racor recommends using at least 200 watts of thermostatically controlled electric heating in the head and/or filter bowl to help avoid biofuel waxing and gelling. Pour point suppressants and biocides are necessary for reliable operation. A coolant heat exchanger is required to heat fuel in extreme cold weather conditions.

Biodiesel is known to attack certain synthetic rubber compounds, making them swell and soften, or shrink and harden. Racor uses very high quality synthetic rubber compounds for seals and hoses. Pour point suppressants and biocides are necessary for reliable operation. A coolant heat exchanger is required to heat fuel in extreme cold weather conditions.

Biodiesel and Biofuel Filtration

Specify The Following:

- Large primary and secondary filters at 50% of their rated flow.
- High quality, corrosion resistant materials in construction.
- High quality, synthetic rubber compounds for seals and hoses.
- Efficient coolant and/or electric heating.
- Fuel source with high efficiency fuel dispensing.

Engineering Leadership

Racor has participated in several biodiesel filtration field tests with major OEMs. We are actively participating in industry wide research and development on biodiesel fuel filtration and water separation challenges. Development of technology to support the use of all biofuels is on-going.
**Fuel Filtration Systems**
Recommended for Biodiesel and Biofuels

<table>
<thead>
<tr>
<th>Fuel Dispensing</th>
<th>Electric Heated Primary Filtration</th>
<th>Coolant Heated Primary Filtration</th>
<th>Electric Heated Secondary Filtration</th>
<th>Coolant and Electric Heaters</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBO</td>
<td>6120R1230</td>
<td>390RC1230</td>
<td>690R122</td>
<td>320HTR4</td>
</tr>
<tr>
<td>RVFS/RVMF</td>
<td>1000FH1230</td>
<td>525</td>
<td>6120R122</td>
<td>Nomad 14287</td>
</tr>
</tbody>
</table>

**Notes:** Marine rated versions are available-consult factory. Also available-Thermoline Heaters, 300 and 500 watt, 12 and 24 volt.
WE ARE YOUR ‘ONE STOP SHOP’ FOR ALL OF YOUR FILTRATION REQUIREMENTS

LIQUID FILTRATION
- CARTRIDES
- FILTER BAGS
- VESSELS
- STRainers

AIR FILTRATION
- VENT FILTERS
- STERILE AIR
- VACCUM
- AIR-CONDITIONING
- FILTER MEDIA

DOMESTIC
- ULTRAVIOLET
- TREATMENT OF BOREHOLES, SPRINGS & WELLS
- WATER TESTING

FUEL FILTRATION
- DIESEL, AVIATION