Technical Bulletin

Racor Filtration and Biodiesel

Renewable Fuels Overview

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

Other renewable “biofuels” available 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 the natural fuel “tar” deposits coating the inside of diesel tanks, piping, and hoses. The 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 the 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 the flow velocity going to each square inch of the media. This extends filter life and increases water removal efficiency. When specifying a new biodiesel fuel system, de-rate fuel filter flow by 50% and install on the vacuum 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. Lower 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 the fuel in extreme cold weather conditions.

Biodiesel is known to attack certain synthetic rubber compounds, making them swell and soften, or the opposite, shrink and harden. Racor uses very high quality synthetic rubber compounds that perform equally well in biodiesel as in standard diesel. Seals subject to biodiesel exposure are generally replaced at the same time as the replacement filter. Racor uses all materials compatible with up to 20% biodiesel blend. Above 20% may require material changes to dynamic seals that are not normally replaced at element change-outs.

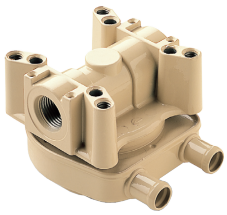
Racor Engineering Leadership

Racor has participated in several biodiesel filtration field tests with major OEMs. Racor is 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 at Racor Division.

Biodiesel and Biofuel Filtration Specification Considerations

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

Racor Fuel Filtration Systems Recommended for Biodiesel/Biofuels

Fuel Dispensing	Electric Heated Primary Filtration	Coolant Heated Primary Filtration (390RC1230 shown on front page, available soon)	Electric Heated Secondary Filtration	Coolant to Fuel Heat Exchanger
FBO 	6120R1230 	777R1230 	690R122 	320HTR4 
RVFS 	1000FH1230 	525 	6120R122 	**Note:** Marine rated versions are available, consult factory.

RACOR®

Parker Hannifin Corporation
Racor Division
P.O. Box 3208
Modesto, CA 95354 USA
Tel: 800-344-3286
Fax: 209-529-3278
http://www.parker.com/racor
E-mail: racor@parker.com

Parker
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