HAUCK TECH NOTE

Biodiesel

What is Biodiesel? Biodiesel is typically made of feedstock from soybean oil, recycled cooking oil (yellow grease), or animal fat. Biodiesel is made using an alcohol like methanol and a chemical process that separates glycerine (a byproduct used commercially in soaps) and biodiesel from fats or vegetable oils. Biodiesel is the only alternate fuel approved by the EPA.

Where is biodiesel used? Biodiesel is commonly used in diesel truck engines as a blend with #2 diesel oil, known as B20 which contains 20% biodiesel by volume and 80% #2 diesel by volume. Several hundred major US trucking fleets now use the B20 blend. However, straight biodiesel or B100 can be used in most diesel engines with no modifications to the engine itself, but it does require special fuel handling. The most straightforward applications for Hauck would include asphalt burners and beta burners. Recent efforts have brought a lower blend, B5 or 5% biodiesel by volume known as Bioheat, into the home heating marketplace.

Political and Public support? A bipartisan JOBS bill signed into law in the fall of 2004 contained a biodiesel tax incentive meant to reduce the cost of biodiesel to the end customer. At the state level, dozens of states have passed legislation favorable to the use of biodiesel in recent years.

Fuel handling concerns? Biodiesel will gel at lower temperatures, thus it will require heating to obtain the appropriate viscosity, 90 SSU AT THE BURNER NOZZLE, for proper atomization. This can be accomplished as is typically done with waste oil using a line heater, heat tracing to the burner backplate, and heated insert probe. Expect similar cold start issues as commonly experienced with waste oil if the fuel is not properly heated. In addition, gelling in the fuel lines, atomizer, control components, etc. could be an issue; therefore, it is highly recommended that a startup purge/low fire ignition be completed with standard #2 followed by switchover to biodiesel with a similar switch to #2/purge for shutdown to remove the biodiesel fuel from the lines. In addition, biodiesel can act as a cleaning agent and can dissolve some of the sediment left in tanks, lines, and heaters from #2 or waste oil which may require more frequent filter changes. Biodiesel should be used within 6 months of manufacture, otherwise the quality of the fuel may degrade; therefore, it should not be left in tanks over the winter months or long term shutdowns.

Energy Content? B100 averages 7 to 9% less heating value per gallon than straight #2 oil.

Standards? ASTM (American Society for Testing & Materials) provides standard D6751 for B100 and blends. Any biodiesel not meeting this standard could be a ‘bootleg’ version such as that derived from discarded restaurant cooking oils, animal fats, etc and should not be considered a reliable/consistent fuel source. A certification known as BQ9000 is open to any biodiesel manufacturer, marketer, or distributor of biodiesel and biodiesel blends in the U.S. BQ9000 is a voluntary accreditation program and is a combination of the standard, ASTM D6751, and a quality systems program that includes storage, sampling, testing, blending, shipping, distribution, and fuel management practices.

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Where can I find Biodiesel? Biodiesel is currently produced in 53 commercial plants across the United States with an additional 64 plants under construction currently. For a list of facilities visit: www.biodiesel.org. Biodiesel is commercially available from over 1,400 distributors in various blends or as straight B100.

Expected Emissions? Hauck currently has no data to quantify potential emissions from burning biodiesel either straight or blended. Combustion testing in residential heating units to date has only been performed with B20 blend which has shown on average about a 20% reduction in NOx emissions, a reduction in SOx emissions, and roughly equivalent CO emissions. At this point it is UNKNOWN what emissions to expect from burning straight B100 or any blend of biodiesel in Hauck burners.

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Jim Feese is a licensed Professional Engineer and holds both Bachelor's and Master's degrees in Mechanical Engineering from The Pennsylvania State University. He has been with Hauck over 7 years. Jim currently serves as Director of Product Development for Hauck, heading up new product development and all laboratory activities. His technical papers have been published in Combustion and Flame and Industrial Heating. His graduate research investigated Nitrogen Oxide (NOx) emission reduction techniques in gaseous flames. Prior to working for Hauck, he worked as a flight test engineer on the F/A-18 SuperHornet for the Department of Navy.