



14 September 2001

John Deere Power Systems

BIODIESEL FUEL IN JOHN DEERE DIESEL ENGINES John Deere PowerTech® and Non PowerTech® Diesel Engines

The expression "Biodiesel" describes the various fuels collectively known as Fatty Acid Methyl Ester (FAME):

- Rape Methyl Ester (RME)
- Plant Methyl Ester (PME)
- Soybean Methyl Ester (SOME)

Biodiesel fuels may be used in John Deere diesel engines only if the fuel meets the ASTM PS121 or DIN 51606 specification (Table A). Performance loss or failures related to the use of these products are not considered the responsibility of John Deere. John Deere product warranty covers defects in workmanship and material as manufactured and sold by John Deere.

NOTE: Raw pressed vegetable oils are NOT acceptable for use for fuel in any concentration. In John Deere engines, these oils do not burn completely, and will cause engine failure by leaving deposits on injectors and in the combustion chamber.

Emission certified engines are equipped with fuel injection pumps (FIP) that are compatible with Biodiesel with the exception of engines with Delphi DP200 series FIP. Refer to Table B for a parts list needed to make the Delphi DP200 compatible with Biodiesel. Consult your local ADS shop for all other FIP.

When using a blend of Biodiesel fuel in a rotary FIP, the engine oil level must be checked daily when the air temperature is -10° C (14° F) or lower. If oil becomes diluted with fuel, oil change intervals must be shortened. Correct intervals may be established by using OilScan®/OilScan Plus™ programs. Another factor due to cold temperatures is the cloud point of the fuel. When blending Biodiesel the minimum temperature at which the fuel will start to cloud is raised.

While a major environmental benefit of a Biodiesel fuel is its ability to biodegrade, users must recognize that storage and handling is of prime importance as indicated below:

- Ensure the quality of the fresh fuel, (fuel meets the specifications in Table A).
- Keep storage and vehicle tanks as full as possible to prevent moisture from collecting inside.
- Ensure all tank caps and covers are installed properly to prevent water from entering.

- Monitor water content of the fuel regularly (Bonds with water, creating acids).
- Limit the storage tanks from extreme temperatures (i.e. Direct sun or frost).
- Problems due to aging of the fuel (Store properly, degrades quickly).
- Wash down spills with clean water immediately to prevent corrosion and damage to paint
- Fuel filter may need to be replaced more often due to premature plugging.
- Check engine oil sump level daily prior to starting, a rising level may indicate lubricating oil delution.
- Instability resulting from blending Biodiesel with mineral diesel fuel.
- Consult your fuel supplier for additives to improve storage and performance of Biodiesel fuels.

Potential problems resulting from deficiencies in the above areas when using Biodiesel fuel in concentrations above 5% may lead to the following symptoms:

- Power loss and deterioration of performance
- Fuel leakage through seals and hoses
- Corrosion of fuel injection equipment
- Coked/blocked injector nozzles, leading to poor atomization of fuel
- Filter plugging
- Lacquering/seizure of internal injection system components
- Sludge and sediments
- Reduced service life

Table A

Biodiesel Property List			
Property	Unit	ASTM PS121-99	DIN 51606 Sept 1997
Density at 15° C (59° F)	g/cm ³ (lb/ft ³)		0.875 - 0.900 (55 - 56)
Viscosity at 40° C (104° F)	mm ² /s (cST)	1.9 - 6.0	3.5 - 5.0
Cloud Point	°C (°F)	Report to Customer	
Flash Point	°C (°F)	Min. 100	Min. 110 (230)
Total Sulfur	% Mass	Max. 0.05	Max. 0.01
Cetane Number	—	Min. 40	Min. 49
Ash Content	% Mass	Max. 0.02	Max. 0.03
Water Content	% Mass	Max. 0.050	Max. 0.03
Copper Corrosion (3 hours, 50° C) (3 hours, 122° F)	Degree of Corrosion	No. 3 Max.	No. 1
Free Glycerin	% Mass	0.02 Max.	Max. 0.02
Total Glycerin	% Mass	0.240 Max.	Max. 0.25
Carbon Residue 100% sample	% Mass	0.05 Max.	
Acid Number	Mg KOH/gm	0.80 Max.	
Total Contamination	% Mass		Max. 0.002
Neutralization Value	mg KOH/g		Max. 0.5
Methanol Content	% Mass		Max. 0.3
Monoglycerides	% Mass		Max. 0.8
Diglycerides	% Mass		Max. 0.4
Triglycerides	% Mass		Max. 0.4
Iodine Number	—		Max. 115
Phosphorus	% Mass		Max. 0.001
Alkali Content (Na + K)	% Mass		Max. 0.0005
(Cold Filter Plugging Point)—Summer	°C (°F)		Max. 0 (32)
(Cold Filter Plugging Point)—Winter	°C (°F)		Max. -20 (-4)

Table B

Delphi (Lucas) DP200 Fuel Injection Pump			
LSN	Part Number	Qty.	Description
Without Boost Control:			
106	7185-816	1	Drive Shaft Seal
With Boost Control:			
106	7185-816	1	Drive Shaft Seal
732	7185-781A	1	Boost Diaphragm Assembly
802	5855-30GG	1	O-Ring

LSN - Line Sequence Number

NOTE: Experience shows that Biodiesel is not always conforming to standards defined. In addition, the specifications listed in Table A are broadly defined which results in variation of the Biodiesel quality. The FAME fuel composition can vary in quality. This variation of quality can cause fuel injection system failures with all engines. The operator must ensure the supply of qualified Biodiesel does not harm any parts of the engines fuel system.



AGRICULTURAL MARKETING CENTER

11145 THOMPSON AVENUE, LENEXA, KANSAS 66219-2302

Contact: Barry E. Nelson
Ph: 913-310-8324
Fax: 913-310-8394
E-mail: NelsonBarryE@JohnDeere.com

John Deere approves eco-friendly Biodiesel fuel for its products*

Lenexa, Kansas – February 21, 2002 – John Deere has approved the use of up to 5% concentration soy-based Biodiesel fuel in its PowerTech® diesel engines. This announcement is just the latest step in John Deere's ongoing 35-year commitment to the development of bio-based alternative fuels that benefit both the environment and the agricultural community.

"We're excited to be able to support the use of Biodiesel in our products," notes Ted Breidenbach, Manager of Worldwide Engine Engineering for John Deere Power Systems. "Biodiesel is a valuable tool for helping reduce engine emissions. It also stands as one of the linchpins in the movement to develop alternative uses for commodity products that can ultimately deliver more value to our producer customers.

"The quality of Biodiesel as a fuel source has improved tremendously in recent years," Breidenbach adds. "We're confident that when it's used per factory specifications it will generate the performance producers have come to expect from their John Deere equipment."

After thorough testing and analysis John Deere engineers have developed the following guidelines to help ensure optimum use of Biodiesel:

- Customers should consult with their local fuel suppliers to be sure the Biodiesel fuel meets the ASTM PS 121-99 or DIN 51606 fuel specifications.

- Biodiesel, by definition is biodegradable, so the higher the concentration of Biodiesel in a fuel blend, the more susceptible the fuel is to degradation and water absorption. Concentrations of no more than five percent Biodiesel are approved to minimize the potential problems associated with fuel degradation. Concentrations beyond 5%, by volume, could adversely affect engine performance and fuel system durability.
- Operators should keep storage and vehicle tanks as full as possible to prevent moisture. Storage tanks should be protected from extreme temperatures and extended storage of Biodiesel fuel should be limited. Routine monitoring of the fuel's water content is also recommended.

Following these guidelines will ensure normal warranty coverage on products fueled by Biodiesel blends.**

John Deere will continue to support further development and use of Biodiesel and additional alternative uses for agricultural commodities. This commitment is evident in the company's support of renewable fuels legislation and in John Deere's ongoing exploration and use of soy-based resins to replace sheet metal on products. An example of this technology is the HarvestForm panels that will be used on John Deere Combines built in 2002. These panels are made from a special polymer derived from corn and soybeans.

"These are exciting technologies that will have long-term benefits for producers, consumers and every citizen with environmental concerns," Breidenbach says.

One of the world's oldest and most respected enterprises, John Deere (www.JohnDeereAg.com) creates smart and innovative solutions, in the form of advanced machines, services and concepts, for customers on the farmsite, worksite, and homesite worldwide.

**Editor's note: This is a revised news release, the original was distributed December 3, 2001.*

*** Users of John Deere Emission Certified Engines, are responsible for obtaining any appropriate local, state, and national exemptions required for the use of Biodiesel.*

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