



Biodiesel Information for Passenger Cars



Mercedes-Benz

Overview

- Definitions of Bio-Based Diesel Fuels
- Mercedes Benz / Daimler Approval Concerning Biodiesel
- Frequently Asked Questions on Biodiesel Fuel Issues
- Frequently Asked Questions on Biodiesel Vehicle Issues

Definitions of Bio-Based Diesel Fuels

Biodiesel: Biodiesel is chemically referred to Fatty Acid Methyl Ester (FAME). It is produced from raw vegetable oil or animal fat and methanol. Biodiesel is chemically distinct from petroleum diesel and bears quality risks, depending on feedstock (fuel ageing, cold flow), given physical properties (fuel evaporation), and accuracy of production process (contaminations). Therefore, the use of biodiesel can have technical implications upon the operation of the engine/fuel system.

Renewable Diesel Fuels: Non-biodiesel fuels. Produced from different biological materials through various production processes:

***Renewable Diesel:** A paraffinic fuel with high quality produced from vegetable oil or animal fat by hydro treatment.*

***Biomass-to-Liquid = Sun Diesel (BTL):** A paraffinic fuel with high quality produced from biomass (e.g. waste biomass) which is converted through high-temperature gasification into a synthetic gas, which is then transferred by Fischer-Tropsch process to the liquid fuel.*

***Vegetable Oil:** Non-biodiesel fuel. Unprocessed vegetable oil extracted from plants is not suitable as fuel for on-road diesel vehicles due to its low cetane number <40, high viscosity, and coking behavior.*

Main Quality Characteristics of Straight Biodiesel (B100 / 100%)

Fatty Acid Methyl Ester content:

Describes the purity of biodiesel and is not regulated in the USA.

Aging characteristics:

Biodiesel tends to oxidize more rapidly than diesel by forming acids and polymers. The oxidation

stability depends on the feedstock used. Soybean Methyl Ester (SME) which is mainly used in the United States has a lower oxidation stability compared to that of biodiesel from other feedstocks.

Contaminations:

Due to production shortcomings there are possibilities for the contamination of biodiesel with a lot of harmful byproducts. There are distributors/retailers selling biodiesel blended diesel that are not certified for the quality of their product and production processes.

Higher biodiesel blending increases the possible negative effects of the above mentioned quality deficiencies and possible damage to the engine/fuel system. Mercedes-Benz/Daimler Approval Concerning Biodiesel.

Mercedes-Benz/Daimler Approval Concerning Biodiesel

Mercedes-Benz approves the use of B5 according to ASTM D975 (standard Ultra Low Sulphur Diesel (ULSD) with a maximum of up to 5 % biodiesel) in all Common Rail Injection (CDI) and BlueTEC diesel engines

The only approved processed biodiesel for B5 blending is one that meets ASTM D975 specification to prevent damage to the engine system from deposits and / or corrosion.

Diesel fuels containing a higher percentage of biodiesel, (e.g. B6 to B20) according to ASTM D7467 as well as straight biodiesel (B100 / 100%) ASTM D6751 may cause severe damage to your engine/fuel system and are not approved.

The Mercedes-Benz Limited Warranty does not cover damages caused by the use of fuels that do not meet Mercedes-Benz approved fuel standards.

Mercedes-Benz vehicles must only use qualified commercial brand fuel that meet Mercedes-Benz approved fuel standards!

Labeling of approved fuels.

Attention! Any percentage of homebrewed biodiesel does not meet Mercedes-Benz approved fuel standards and is not approved!

Frequently Asked Questions on Biodiesel Fuel Issues

- Fuel Regulations in the USA Concerning Biodiesel
- Home Brewed Versus Commercially Produced Biodiesel
- Technical Risks of Diesel Fuel Containing Biodiesel

Fuel Regulations in the USA Concerning Biodiesel

Regular ultra low sulfur diesel (ULSD) acc. to ASTM D975 might contain biodiesel up to 5 % v/v.

Recently another specification for an ULSD with a biodiesel content of 5.5 to 20 %v/v = B20 was passed.

Biodiesel which is used for blending or as straight biodiesel (B100 / 100%) has to fulfill the ASTM D6751. The requirement for aging stability is not sufficiently regulated. B100 itself is not suitable for DPF applications

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It is up to the individual US states to adopt the ASTM standards.

Due to quality deficiencies B20 and B100 are not suitable for passenger car and light duty truck applications of Mercedes-Benz equipped with diesel particulate traps.

Fuels which are labeled like this are:
Approved by Mercedes-Benz!

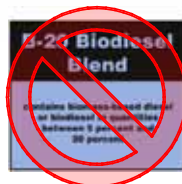
Only diesel with the ULSD label is the approved fuel. Up to 5% vol biodiesel (ASTM D975): no special labeling



Fuels which are labeled like this are:
Not approved by Mercedes-Benz!

100% Biodiesel (ASTM D6751): B100

Up to 20% Vol Biodiesel (ASTM D7467):B20



Home Brewed versus Commercially Produced Biodiesel

For home brewing, the production process cannot be controlled in an adequate manner concerning completeness of reaction, conditioning, processing and cleaning necessities. A qualified production process and also biodiesel blending would require a complete analytical fuel laboratory, which home brew producers would most likely not invest in. This may lead to fuels not meeting ASTM specifications.

Private fuel storage facilities may not be suitable.

Fuels which do not meet the ASTM specifications are NOT approved by Mercedes Benz and the Mercedes-Benz Limited Warranty does not cover damages caused by the use of fuels that do not meet Mercedes-Benz approved fuel standards !

Frequently Asked Questions on Biodiesel Vehicle Issues

- Technical Risks of Diesel Fuel Containing Biodiesel
- Further Impacts of Biodiesel on Vehicle Characteristics
- Recommendations for a Vehicle With Extended Standstill Period Which Use Diesel Fuel Containing Biodiesel for Periods > 4 Weeks
- Warranty Guidelines for Biodiesel Usage

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Technical Risks of Diesel Fuel Containing Biodiesel

Clogging of fuel filter caused by

- a) soaps, which may be formed by biodiesel components (aging products and contaminants)
- b) microbes, which may contaminate biodiesel blends.

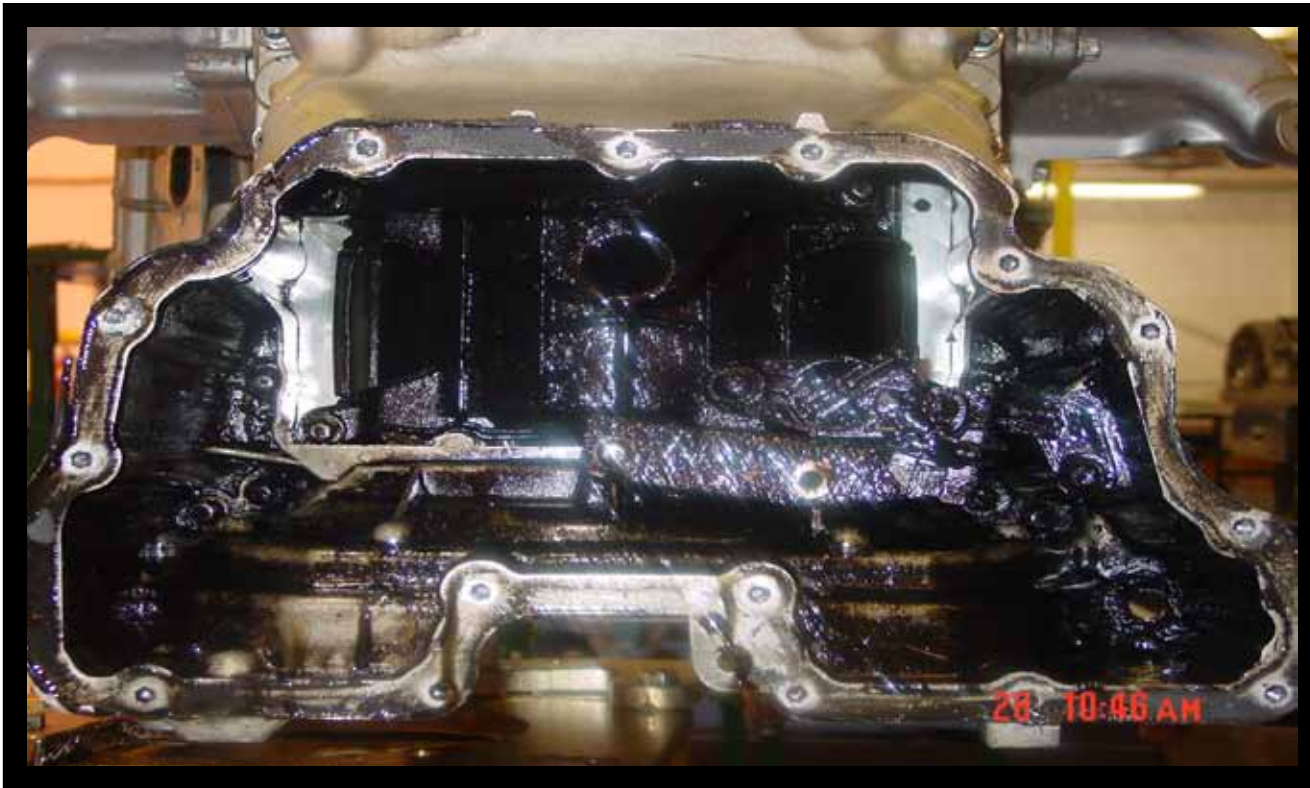
Fuel gelling under cold climate conditions, e.g. additives of biodiesel and conventional diesel are sometimes incompatible.



Technical Risks of Diesel Fuel Containing Biodiesel (continued)

Sludge formation within engine oil due to biodiesel aging products.

Increase in engine oil degradation when driving under low load conditions as biodiesel has difficulty evaporating from engine oil.



Technical Risks of Diesel Fuel Containing Biodiesel (continued)

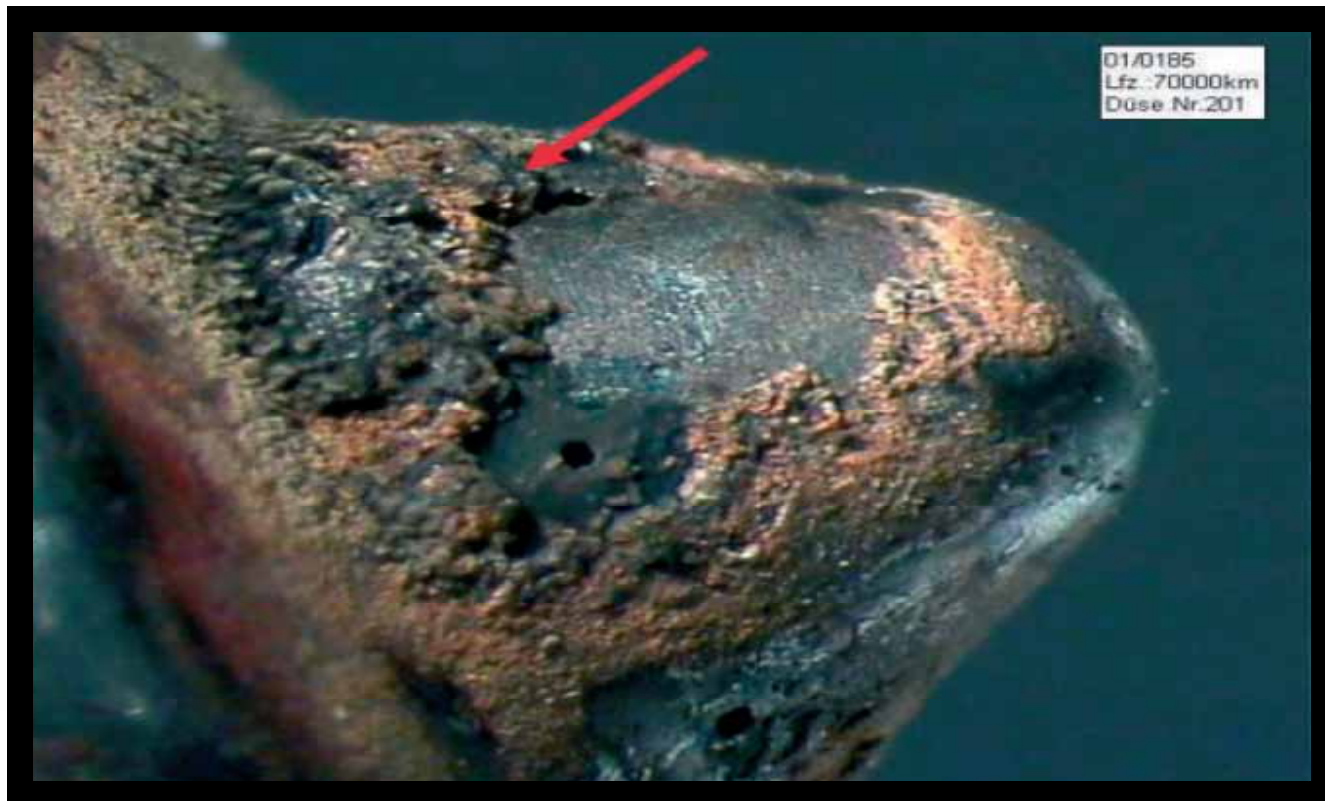
Sticking /corrosion of high pressure pump parts / injectors especially after a longer stand-still period of the vehicle due to aging products of biodiesel (sticky polymers, acids).



Technical Risks of Diesel Fuel Containing Biodiesel (continued)

Nozzle coking / and injector deposits accelerated through by-products of biodiesel.

Deposit formation on piston rings and also on lambda sensors, exhaust gas recirculation system parts.



Further Impacts of Biodiesel on Vehicle Characteristics

Impact of Biodiesel on Engine Noise

There is no negative impact on noise, vibration, or harshness when using approved biodiesel containing ULSD (B5)

Burning Properties of Diesel Fuel Containing Biodiesel (Emissions)

There is no change in the level of regulated emissions when using approved biodiesel blended ULSD (B5)

Exhaust Smell When Using Diesel Fuel Containing Biodiesel

The use of B5 will not result in a different smell.

B100 exhaust has a different smell than that of diesel exhaust. (smells like French fry oil).
For diesel containing biodiesel, smell depends on blending rate.

Fuel Consumption and Engine Power Comparison (Diesel vs. Biodiesel Blended Diesel)

Biodiesel containing up to B5 will have no difference in terms of power and fuel economy notable when compared to normal diesel.

Biodiesel > B5 has a lower energy content than diesel fuel which results in a slight power loss and a slightly increased fuel consumption.

Recommendations for a Vehicle With Extended Standstill Periods Which Use Diesel Fuel Containing Biodiesel for Periods > 4 Weeks

Before parking the vehicle, the fuel tank should be filled. Reducing the empty volume of the fuel tank reduces the amount of oxygen left in the fuel tank which leads to biodiesel aging.

The vehicle should not be parked in the sun, higher temperature will cause quicker biodiesel aging and can lead to the formation of corrosive acids and sticky polymers.

When vehicle idling is not possible during and after the stand still period as listed above, an authorized Mercedes-Benz dealer may have to change hydraulic parts and pump out the fuel tank.

Warranty Guidelines for Biodiesel Usage

Refer to the appropriate owner, maintenance manuals for your vehicle.

Diesel fuel with up to B5 Biodiesel content according to ULSD specification ASTM D975 meets Mercedes-Benz approved fuel standards and will not void coverage under the Mercedes-Benz Limited Warranty.

All diesel fuels containing greater than B5 biodiesel as well as straight biodiesel (B100 / 100%) are not approved by Mercedes-Benz as the risk for severe engine damage is increased. Any damages caused by the use of such non-approved fuels will not be covered by the Mercedes-Benz Limited Warranty.

Vehicle Modifications for Biodiesel Usage

No modification kit is necessary for up to B5 Biodiesel content.

Biodiesel content greater than B5 is NOT approved for Mercedes-Benz vehicles, hence no approved modification kit is available.

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anticorrosion/antifreeze coolant meeting factory specifications. Please see your authorized Mercedes-Benz Center for more information on this subject.

Emission System Maintenance

Gasoline Engines

The U.S. Environmental Protection Agency and, in California, the Air Resources Board have certified that the emission control systems of your vehicle comply with the applicable exhaust emission standards for MY 2010 vehicles.

To be certain that the emission control systems function as designed, regular maintenance is necessary for components of the vehicle which affect exhaust and evaporative emissions composition.

The vehicle owner is responsible for the regular maintenance of the emission control system, as well as the use of premium unleaded gasoline with an anti-knock index of at least 91 (displayed on the pump) in all gasoline engine models unless otherwise specified.

Failure to properly maintain the emission system may result in repairs not being covered by the emission system warranties. Explanations of each maintenance job are given on (> page 10).


Emission Control System Caution - Gasoline Engines

Your Mercedes-Benz vehicle is equipped with both a three-way catalyst and a closed loop oxygen sensor system to comply with current exhaust emission regulations. Keep your vehicle in proper operating condition by following our recommended maintenance instructions as outlined.

The following has to be adhered to:

- a) In all gasoline engine models, use only premium unleaded gasoline with an anti-knock index of at least 91 (as displayed on the pump) unless otherwise specified.** Damage to the engine could occur if premium unleaded fuel is not used. Refer to the Operator's Manual for special precautions.
- b) Leaded gasoline should not be used under any circumstances.** Damage to the emission control components will result.
- c) In select models, the use of Ethanol (E85) is also permissible.** Models capable of also operating with E85 are identified by a label on the fuel filler flap reading 'Premium gasoline or E85 only!'. Do not use Ethanol fuel (E85) to operate any vehicle unless it is specifically identified as Ethanol fuel (E85) compatible. Damage to the engine could occur if improper fuels are used. Refer to the Operator's Manual for special precaution.
- d) The specified engine maintenance jobs have to be performed completely and at the required intervals.** Correct ignition timing and properly functioning spark plugs for instance are important for the service life of the catalyts. Failure to properly perform the specified maintenance jobs may adversely affect the emission control system on the vehicle and reduce its service life.
- e) The operation of the emission control system must not be altered in any way.** Alterations are not permissible by law. In addition, alterations may result in damage to the catalyts, increased fuel consumption, and impaired engine running conditions.
- f) Irregular engine running conditions should be corrected immediately by an authorized Mercedes-Benz Center.** Such irregular running conditions can influence the proper function of the emission control system.

If the "CHECK ENGINE" indicator lamp in the instrument cluster illuminates when the engine is running, it indicates a possible

 **Warning!** Please make sure you read the technical documentation, such as the Operator's Manual and workshop information, before carrying out any maintenance work.

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