



Kubota Canada Ltd

ENGINE INFORMATION

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Service Info: XXX

Engineering Info: XXX

Parts Info:

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SUBJECT: Use of Biodiesel in Kubota Diesel Engines

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Introduction to Biodiesel

Biodiesel fuels are methyl or ethyl esters derived from a broad variety of renewable sources such as vegetable oil, animal fat etc. Esters are oxygenated organic compounds that can be used in compression ignition engines.

Soy Methyl Ester biodiesel (SME) is derived from Soy Bean oil and is commonly used in the USA and Canada.

Rape Methyl Ester biodiesel (RME) is derived from rapeseed oil and is commonly used in Europe.

Collectively, these fuels are referred to as Fatty Acid Methyl Esters (FAME).

Biodiesel Blends

Biodiesel is produced in pure form (100% bio-diesel), which is referred to as B100 or Neat Biodiesel.

Biodiesel may be blended with petroleum based fuel in various percentages.

e.g.: A blend containing 5% biodiesel and 95% petroleum based fuel is referred to as a B5 blend.

Concerns Regarding Biodiesel

Kubota, along with the Fuel Injection Equipment manufacturers (FIE) has the following concerns regarding the characteristics of biodiesel ¹:

- Free Methanol
- Dissolved and free water
- Free glycerine
- Mono & diglycerides
- Free fatty acids
- Total solid impurities
- Alkaline metal compounds
- Oxidation and thermal stability

According to a statement produced jointly by the Diesel Fuel Injection Equipment manufacturers, B100 biodiesel has been found to create the potential for the following failures/issues in diesel engines ¹:

- Corrosion of Fuel Injection Equipment (FIE)
- Increased injection pressure
- Low pressure fuel system blockage
- Elastomeric seal failures
- Increased dilution and polymerization of engine sump oil
- Fuel Injector spray hole blockage
- Pump seizures due to high fuel viscosity at low temperatures

Kubota accepts the use of biodiesel in Kubota diesel engines and Kubota diesel powered products

ONLY if the fuel meets the following conditions:

- a. **Maximum of 5%, by volume**, biodiesel blended with petroleum based fuel may be used (B5 Blend).
- b. Biodiesel may be blended in European diesel fuel according to EN590 specifications and blended in North American diesel according to ASTM D975 specifications.
- c. Biodiesel used as neat (B100) or as a blend component must meet the minimum requirements provided by EN14214 (EU Standard) or ASTM D6751 (US Standard).
- d. B5 blended fuel must also meet EN590 or ASTM D975 specifications.
- e. Raw pressed vegetable oils are **NOT** acceptable for use in any concentration.
- f. The producer of the B100 fuel and/or the marketer of the B5 blended diesel must be BQ-9000 certified. Kubota does not recommend local blending of such fuel as it is difficult for local blenders to meet the quality standards above.
- g. Users of Kubota Emissions Certified Engines are responsible for obtaining any appropriate local, state / province and national exemptions required for the use of biodiesel.

¹. "FAME Fuel – Joint FIE Manufacturers Statement", Issued June 2000

Additional care required when using Biodiesel

Enhanced care must be taken, even if the biodiesel meets the said standards above.

Kubota has the following concerns and recommendations regarding the use of biodiesel:

- a. Biodiesel can attract moisture and may contain higher water content than conventional diesel fuels.
- b. Keep storage and vehicle tanks as full as possible to prevent moisture from collecting inside. Ensure that all tank caps and covers are installed properly to prevent water from entering.
- c. Shorter maintenance intervals, such as cleaning the fuel system, replacing fuel filters and fuel lines, may be required. Biodiesel can accelerate microbial growth compared to petroleum based diesel fuel. Microbial contamination and growth can cause corrosion in the fuel system and cause premature plugging of the fuel filter.
- d. Kubota strongly recommends using a fuel system water separator.
- e. Follow the standard Kubota oil change interval for the given engine along with checking the oil level daily prior to starting the engine. Extended oil change interval beyond the standard interval can cause engine damage.
- f. Cold weather conditions can lead to fuel system plugging, hard starting and other possible failures. Plugging can include both fuel filters and fuel lines.
- g. Degradation of the fuel in the supply chain or in the vehicle:
 - Accelerated by the presence of oxygen, water, heat and impurities
 - Biodiesel should not be stored for more than 3-months.**
 - Prior to engine storage, the engine should be flushed for a minimum of 30-minutes with petroleum based diesel fuel.
- h. If Biodiesel is spilled onto painted surfaces, it should be cleaned off immediately to prevent damage to the painted surface.
- i. Biodiesel, by definition is biodegradable, so the higher the concentration of biodiesel in a fuel blend, the more susceptible the fuel is to degradation affecting engine performance and fuel consumption. Concentrations of up to no more than 5% biodiesel are approved to minimize potential corrosion on aluminium, zinc along with rubber and plastic parts.

Modification or adjustment of tamper resistant parts of the engine is illegal and against Exhaust Emissions Regulations.

This is the case regardless of the fuel being used and subject to punishment under such rules in effect.

The use of biodiesel does not affect the Kubota warranty for material and workmanship. However, any failures attributed to inappropriate use of or contaminated biodiesel, or any petroleum based diesel fuel, are not factory defects and will not be covered under Kubota's warranty.

This position is in accordance with Kubota Canada Ltd Service Policy and Warranty Statement dated January 1st 2003

This bulletin is based on the most up-to date information available.

Specifications may and or will be changed or modified without notice.

John Baxter 2006