



Maritec Tanker Management Pvt Ltd

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STANDARD OPERATING PROCEDURE

19/2024

Date: 26th Aug 2024

SUBJECT: SOP Biofuels - For Bunkering / Sampling / Storage & Handling

Biodiesel is a commercially available, lower-carbon-intensity fuel for use in diesel engines and boilers. It can directly replace or be blended with distillate and residual fuel oils.

Three types of biofuels are relevant for maritime shipping:

- **FAME (Fatty Acid Methyl Ester)** is produced from vegetable oils, animal fats or waste cooking oils by transesterification. This is the most widely available type of biodiesel in the industry and is often blended with regular marine diesel. International standards: ISO 8217:2017, EN 14214, ASTM D6751, EN 590.
- **BTL (Biomass To liquid)** fuels are synthetic fuels that are produced from biomass by means of thermo-chemical conversion. The final product can be fuels that are chemically different from conventional fuels such as gasoline or diesel but can also be used in diesel engines. International standards: EN 16709, EN 15940
- **HVO/HDRD (Hydrogen Vegetable Oil/Hydrogenation Derived Renewable Diesel)** is the product of fats or vegetable oils – alone or blended with petroleum – refined by a hydrotreating process known as fatty acids-to-hydrocarbon hydrotreatment.
Diesel produced using this process is often called renewable diesel to differentiate it from FAME biodiesel. HVO/HDRD can be directly introduced in distribution and refuelling facilities as well as existing diesel engines without any further modification. International standards: ASTM D 975

Currently, **FAME** is the most prominently used biofuel in marine applications, It is either used in blends with traditional petroleum fuels or as 100% biofuel.

Pros and Cons of Biofuels as marine fuel.

PROS	CONS
+ Practically no SOx emission	- Slightly increased NOx emission
+ Reduction in total CO2 emission	- Contains ~10% less energy than petroleum diesel
+ Lower particulate emissions	- Separation of water more challenging
+ Biodiesel mixes well with petroleum diesel	- Solvent characteristics may degrade rubber and attack certain metals
+ Good Lubrication properties	- Can foster heightened microbial activity
+ Biodiesel blending decreased the kinematic viscosity, density, MCR, sulfur, water, ash, and metal content of marine fuel.	-The Oxygen presence in biodiesel can cause fuel degradation over time and the formation of peroxides, acids, and other insoluble compounds. This affects the long-term storability of the fuel, and can result in fuel filter clogging due to the oxidation by-products.
	- Cold flow properties can be poorer than with fossil diesel



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Fuel Compatibility Assessment:

- Some Engines/ Boilers may require modifications to the fuel system or the equipment burning the Biofuels. MTM PL will check and seek confirmation with Engine/ Boiler Manufacturers and inform the vessel prior to the bunkering and consumption of Biofuels. Engine/ Boiler Manufacturer's instructions and guidelines to be strictly followed when using Biofuels.
- Ship staff to carry out a Risk Assessments and inform the Office prior to Bunkering and use of Biofuels.
- Fuel supplier to furnish MSDS sheet, prior to the biofuel being Bunkered.

Fuel Quality Verification:

- As with other fuels, Bio- blended residual or distillate marine fuels have specification limits in the new ISO 8217: 2024 standards and B100 fuel will be tested as per ASTM D6751 standard. If there are any additional tests to be carried out on Biofuels, same will be communicated to the testing lab by MTM PL.
- **Additional tests, when seen necessary for Bio residual fuels.**

Bio-residual Fuels	S. No	Test Details	Why?	Sample Quantity
Additional tests	1	GCMS Acid Analysis	The GCMS acid analysis test will determine the concentration of glycerin and free fatty acids in the blend. Elevated levels of glycerin and free fatty acids can result in instability issues and pose potential risks such as corrosion, clogging, and degradation of fuel system components.	20 ml
	2	Corrosiveness – Steel Corrosion Test (ASTM D665) at two different temperatures of storage and purification temperature	Steel corrosion test helps determining the compatibility of the fuel with steel components in the presence of water. It provides valuable insights into whether the fuel may cause corrosion or damage to these steel surfaces over time.	600 ml
	3	Aging study	Biodiesel can degrade overtime. The presence of oxygen in the biodiesel fuel results in low oxidative stability causing the fuel to become susceptible to degradation over time and forming peroxides, acids, and other insoluble compounds. The aging study will assist in evaluating the overall stability properties of these blends during a 60-day storage period.	200 ml
	4	GCMS screening	The presence of high levels of phenolic compounds, polymers, and alcohols in fuels can result in corrosion, wear, and sludging issues. GCMS screening will help determine the presence of these compounds.	10 ml

A "Proof of Sustainability" (PoS) Document from a recognised Authority must be provided by the Bunker Supplier in addition to the Bunker Delivery Note, to facilitate the verification of Base Stock of the Biofuel. However in practice, the Bunker Suppliers are only able to provide the PoS after a few weeks of bunker supply.

Sampling, Storage and Handling of Biofuels:

- A proper representative sample during the bunkering process must be taken at the manifold; the sample bottle clearly labeled with all the required information and thereafter promptly dispatched via the local Agent to the nearest Testing lab for analysis.
- Bunker Biofuels in tanks that have been used previously for storing Biofuels; if receiving biofuels for the first time, ensure that the designated tanks are stripped to the minimum possible level of the previous fuel it contained.



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- Record accurately tanks storing biofuel to safeguard segregation and prevent contamination.
- Maintain storage temperature of the biofuel at least 10°C above the pour point, to avoid wax formation, oxidation and growth of bacteria, which requires a layer of free water at the bottom of the storage tank and can cause severe problems in the fuel system. The best defense is to drain the tank regularly and through purification.
- Biofuels tend to deteriorate if stored for long periods of time, so they are to be consumed at the earliest following the First- In-First Out (FIFO) principle. (But not before the sample results are received onboard).
- If the Biofuel supplied cannot be completely used inform the Office, so that appropriate steps can be taken, including retesting of the fuel, depending on the period of storage.
- Like all residual fuels, Biofuels are not to be used unless the analysis reports for the fuels are received.

Fuel Transfer Procedures:

- Before transfer of Biofuel, the Settling tank is to be lowered to the minimum level possible, including draining the remainder of the previous fuel from the Settling tank to the Overflow tank.
- Once Biofuel is transferred to the Settling tank, the level in the Service tank is to be dropped to the lowest level possible, so as to reduce incompatibility issues between the fuel in the tank and the incoming Biofuel, and purifier run to fill up the Service tank.
- Ensure that once a Biofuel is put in use, the fuel is to be totally consumed before changing over to another type of fuel, this is to prevent mixing of the fuels leading to incompatibility issues.

Monitoring and Testing:

- Alter the engine room watchkeeping schedule to ensure continuous monitoring of engine parameters during the first 24 hours after the biofuel has been put in use.
- Monitor fuel filter condition for clogging by checking increase in back pressure or frequency in the automated back-flushing cycles.
- Check engine performance for any deviation from results recorded when operating on Normal fuel, because due to the lower Calorific value of Biofuel there may be an increase in fuel consumption and reduced Peak pressures.
- After 24 to 36 hours of use, draw one sample from the sampling point on the main fuel oil line to take a representative sample of the fuel in use, and a second sample from the Service tank. These two samples are to be landed at the next arrival port for analysis, with proper labeling to indicate the point of sampling.



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- If test kits are available onboard kindly carry out a compatibility test between the Biofuel and the fuel in use or to be used.
- Refer to Engine Manufacturers instructions for any recommended change in Inspections/Overhauls intervals, or if any scrap down analysis is recommended.

Record Keeping:

- Maintain records of biofuel usage with start and stop timing entries made in the Logbook, and any operating issues, abnormalities or incidents related to the use of biofuel, are to be immediately reported via a phone call to the MTM PL Office.
- Ensure compliance with National and International regulations related to biofuel usage on ships.
- Check Port environmental regulations as Biofuels can increase NOx emissions.

Crew Training:

- Train the ship's crew in understanding the importance of this Standard Operating Procedure.

**Best Regard,
MTMPL**