

TECHNICAL INFORMATION

HANDLING MARINE BIOFUELS

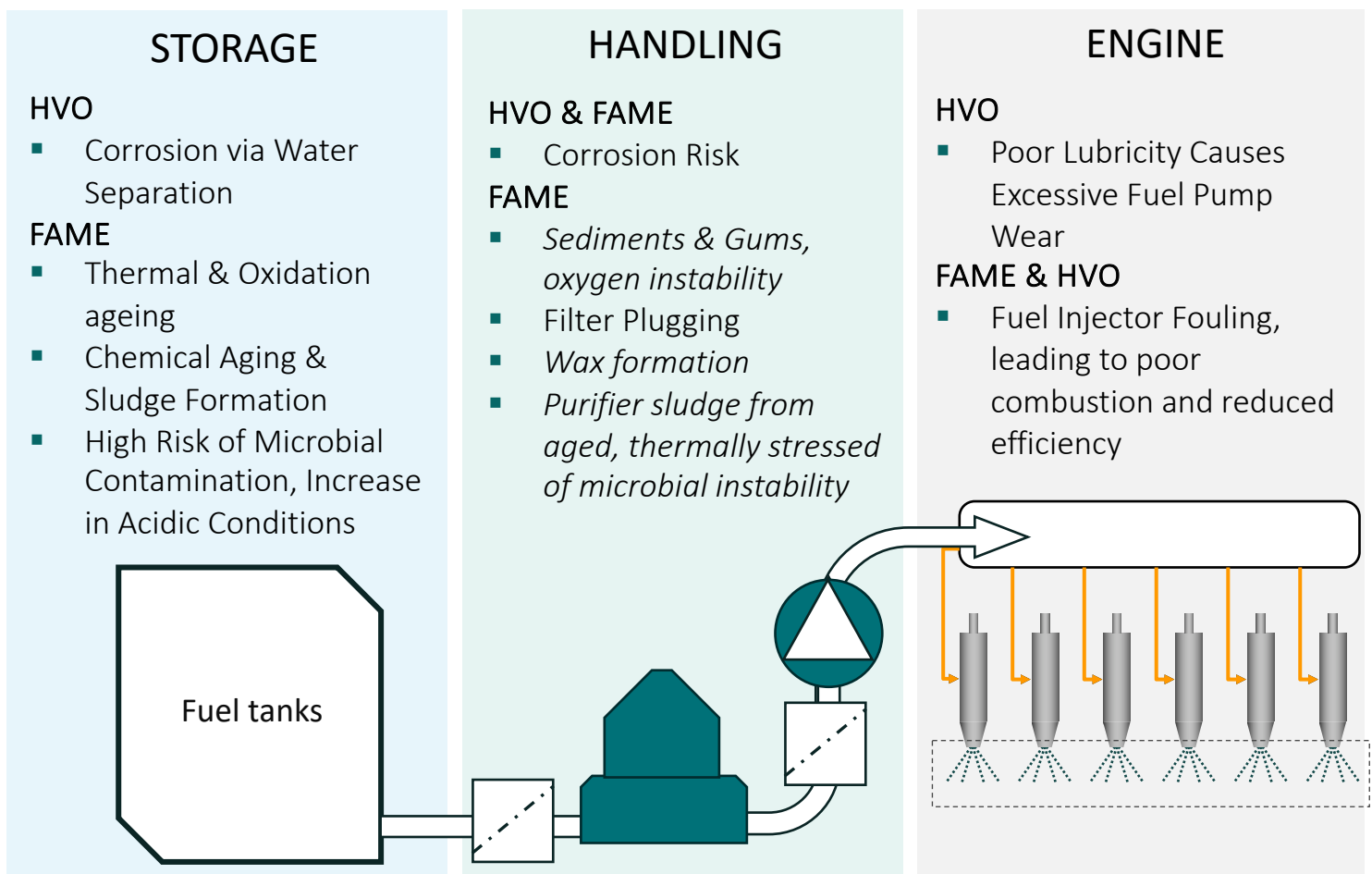
All content and images © Innospec 2024

Crew Handling

When using fuels that contain FAME & HVO, Vessel crew must be trained to recognise the potential hazards that may arise in order to safely operate and maintain the vessel to the same standard to which the industry has become accustomed.

The OEMs of all equipment that interacts with these fuels must confirm the compatibility of the fuel with their equipment and provide operational advice.

Below is a brief overview of how biofuels impacts the three main areas related to fuel performance onboard.



Biofuel Best Practice

Hundreds of sea trials using Biofuel blends have now been completed. During the majority of these tests, the vessel began consumption within a week after bunkering, and the fuel was quickly consumed. Therefore, little data exists exploring the long-term consequences of burning biofuel, which might include Thermal Oxidation, Microbial Contamination, Cold Flow Handling Issues & Deposit Formation. However, the following learning points have been determined:

- The switch from VLSFO to Biofuels has the potential to be just as demanding as the adoption of VLSFO from HFO four years ago. Biofuels may provide a cleaning effect to storage tanks, lifting old and causing excessive sludge formation in the fuel system. **Therefore, it is crucial to clean Storage tanks before bunkering biofuel. In service tank cleaning using Innospec additives is a well proven strategy.**
- Existing fuel within Settling and Service tanks must be reduced to minimum before using biofuels.
- Due to the different calorific value of biodiesel the energy content must be tested according to ASTM D240. Calculations to estimate energy content in conventional fuels, are not applicable with biofuel. Engines may require adjustment according to the correct lower calorific value (energy content) for the engine to run efficiently.
- OEMs should be contacted to ensure engine compatibility, especially with Engine Lubricating Oil.
- Water should be avoided and removed on a regular basis from the system. Regular fuel analysis every 3-6 months is recommended, to monitor water, detect degradation of fuel and indicate microbial growth.
- The crew needs to be informed and instructed on the use and additional requirements in the use of Biofuels.

If you are considering the use of Biofuels, you must clean the fuel tanks / system prior to the switch. For more information on how Innospec technology can assist, please get in contact with your local Innospec representative.

Biodiesel Quality Standards

- All sustainable biofuels must comply with ISCC.EU in order to be considered for carbon offset

[ISCC EU – ISCC System \(iscc-system.org\)](https://www.iscc-system.org/)

- Biodiesel is tested to EN14214 standard
- ISO8217:2024 requirement for Bio-fuel (pending)

Singapore Workshop Agreement

The Workshop Agreement (WA:2 2022) is intended to cover the quality for marine biofuels:

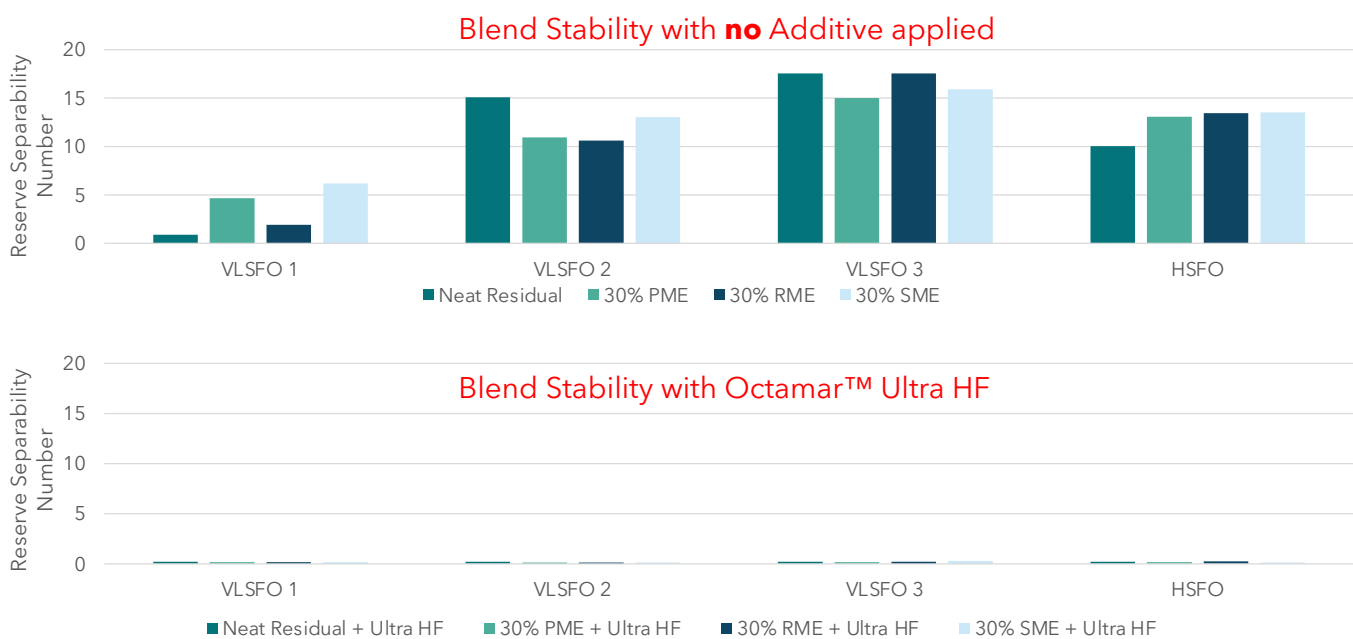
- EN 14214 (B100) ASTM D7963 (B100)
- Free from bacteria, mould and yeast
- Energy content ASTM 240
- Unwanted: Free Fatty Acids, methanol, glycerine
- Cold flow properties WAT, CFPP, CP

[Singapore Standards \(singaporestandardseshop.sg\)](https://www.singaporestandardseshop.sg/)

Case Study: VLSFO Biofuel Blends - 30% FAME

During this study residual fuel oils (3 x VLSFO & 1 x HFO) were co-mingled with 3 varieties of FAME; Palm Methyl Ester (PME), Rapeseed Methyl Ester (RME) & Soybean Methyl Ester (SME) specifically selected due to their differing physical & chemical properties to provide sample diversity i.e. 12 Combinations.

The experiment involved conducting the test ASTM D7061*, which indicates a fuel's tendency to produce asphaltene sludge. A number <1 indicates a stable fuel with dispersed Asphaltenes. Anything above this value indicates instability, with an increasing value indicating increasing severity.



What did we learn from this Study?

The presence of FAME at 30% does not provide a stabilising effect to residual fuel and the results indicate the chance of forming sludge remains high.

Based on this limited evidence, the use of PME (Palm Methyl Ester) and SME (Soy Methyl Ester) may lead to a high propensity to sludging.

Innospec's **Octamar™ Ultra HF** provides excellent performance benefits using recommended treat rate of 1:10,000 and can minimise the risk of sludge formation irrespective of the FAME feedstock used.

*Standard Test Method for Measuring n-Heptane Induced Phase Separation of Asphaltene-Containing Heavy Fuel Oils as Separability Number by an Optical Scanning Device

SOLUTION: Fuel Additives Can Make The Difference

Most performance issues caused by Biofuels can be addressed and prevented using additive technology. < Below is the list of additive technologies available for the common issues found in different types of biofuel;

FAME



Oxygen stabilisers

Oxidation of *FAME* at high temperatures can form sticky unstable peroxide gums, In turn causing engine failure & increasing corrosion of parts.

Anti-Oxidants are used to reduce fuel degradation over time, extending the 'shelf-life'.



Microbial prevention and cure

One of the major issues with Bx biofuel storage is water ingress, as *FAME* readily absorbs moisture. Common issues include sludge and Microbiologically Induced Corrosion (MIC).

Biocide additives provide a suitable treatment for such cases, however, the best preventative practice is good housekeeping



Cold flow and wax improvers

FAME's poor cold flow properties can create operational issues such as filter blocking amongst others.

Pour Point Depressants & Detergents mitigate common issues caused when FAME becomes cold

HVO



Lubricity Improvers

It is recommended that Lubricity Improvers are dosed in the fuel system to reduce wear by coating metal surfaces & pumps with a fine protective film. unless pretreated by the supplier will have poor lubricating properties, in turn increasing the likelihood of excessive wear occurring.

Choosing the correct product is vital for your business - Innospec fuel additives include innovative solutions for:

- ✓ Biodiesel Stability
- ✓ Biodiesel Low Temperature Handling
- ✓ Biodiesel Operability

Innospec’s **multi-functional** product range has been designed to be “Bio-ready”, providing full coverage of the various biofuels available in the marine market.

Fuel Type	MGO	VLSFO	MGO or VLSFO	HVO
Bio Content	<B30	<B30	B30 – B100	R100
Innospec Product	Octamar™ Ecopower	Octamar™ Ultra HF	Octamar™ Bio 403E	Octamar™ LI-5 Plus
Biofuel Stabiliser	✓	✓	✓✓	✓✓
Distillate Stabiliser	✓	✓	✓	✓
Asphaltene Stabiliser		✓✓		
Ignition Improver	✓✓	✓		
Combustion & Soot Catalyst	✓✓	✓✓		
Corrosion Inhibitor	✓	✓	✓	✓✓
Detergent	✓✓	✓	✓✓	✓
Lubricity Improver				✓✓

Additionally, Innospec offer **single function** additives which are also “Bio-ready”.

Fuel Type	MGO	All Biofuel Types
Bio Content	<B30	All
Innospec Product	Octamar™ Winterflow	Grotamar™ 71
Cold Flow Improver	✓✓	
Biocide		✓✓

Whatever your current and future biofuel concerns and needs, you can rely on Innospec's proven technology.

Please contact your local sales representative for more information.
 email: CSC.americas@innospecinc.com CSC-emea@innospecinc.com CSC.asiapacific@innospecinc.com
 For technical support or questions please email: marine.technical@innospecinc.com

July 2024

The information contained in this document is provided free of charge and is based on technical data that Innospec believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Innospec accepts no liability for any loss, damage or expense arising from, or in connection with, the use of the information. Furthermore, none of the contents of this publication should be taken as a licence to operate under any patent, nor as a recommendation to infringe any patent.

Privacy Notice: <https://innospec.com/about-us/corporate-governance/third-party-privacy-notice/>