Alfa Laval on board

– 17 000 employees, sales USD 4 billion, 42 major production units, more than 2500 patents

17 Product groups

Steam and hot water production

Waste heat recovery

Thermal fluid heating systems

Heating and cooling

EGR water treatment

Desalination

Exhaust gas cleaning

Ballast water treatment

Inert gas system

Crankcase gas cleaning

Gas combustion

Oily waste treatment

Fuel conditioning

Cargo pumping

Filtration

StormGeo

Oil cleaning

Tank cleaning

FRAMO

Treatment of Biofuel on board – Do's and don'ts

− Apply your Fuel treatment as you do since January 2020

- Biofuel is for all practical purposes Fuel
- All precautions taken for the 2020 Low Sulphur regulations apply

✓ Do's

- Have a Fuel Management Plan in place
- Dewater the tanks at all times
- Store at the right temperature

✗ Dont's

- Mix fuels in the same tank
- Store biofuels for a long time – use them as soon as possible.
- Store it too cold <u>or</u> too warm
  - Too cold: Wax may appear
  - Too warm: Oxidation, polymerisation and general bacterial growth increase significantly
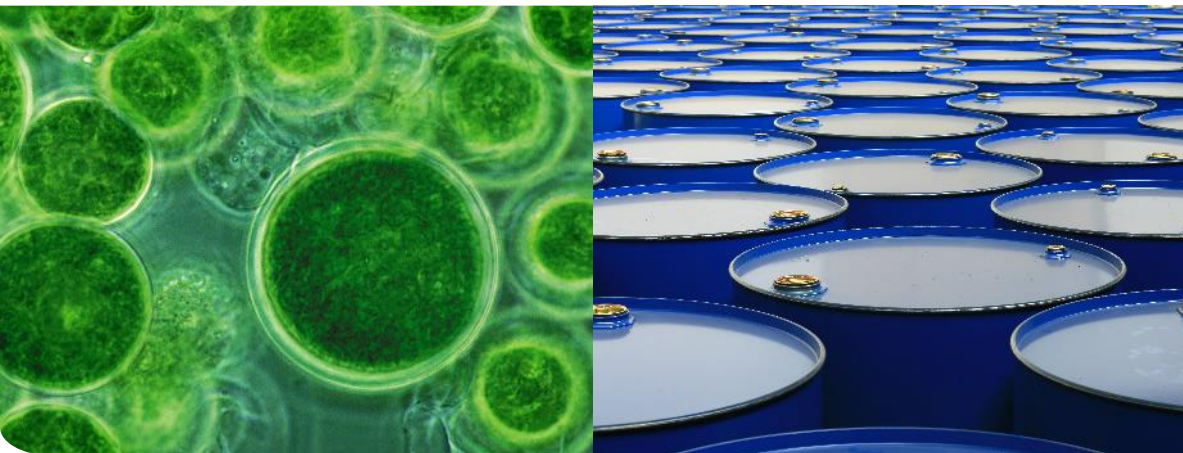
Biofuel and Fuel equipment

− Potential effects of Biofuel on components inside the equipment

Negative properties of FAME compared to FO/GO

- Equipment must handle the increased corrosiveness
- The FAME itself can be oxidized by the materials used in the equipment

What to think about when considering the process equipment?

| Metals	• Bronze, brass, copper, lead, tin, and zinc may oxidize FAME
Seals & Gaskets	• Swelling and aging of materials can lead to leakages and malfunctioning of equipment • Research by Alfa Laval shows that this phenomenon is not significantly worse than for residual fuels
Polymers	• Potential swelling of polymers might affect its material properties

Alfa Laval recommends to check with suppliers of sub equipment
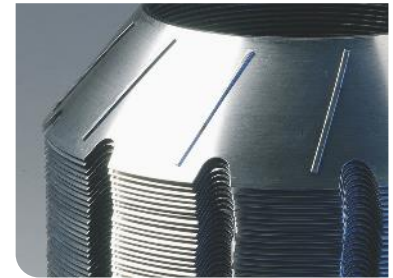
Cold flow properties of Diesel Oil

Cold Flow properties are typically related to distillates – residual fuel has to be heated to lower the viscosity.

Typical cold flow properties (from low to high temperature):

- Pour Point (PP): The lowest temperature fuel flows (pumpable).
- Cold Filter Plugging Point (CFPP): The lowest temperature fuel passes a filter.
- Cloud Point (CP): The lowest temperature wax crystals appear. Cloudpoint can also be expressed in WAT (Wax Appearance Tempeture).
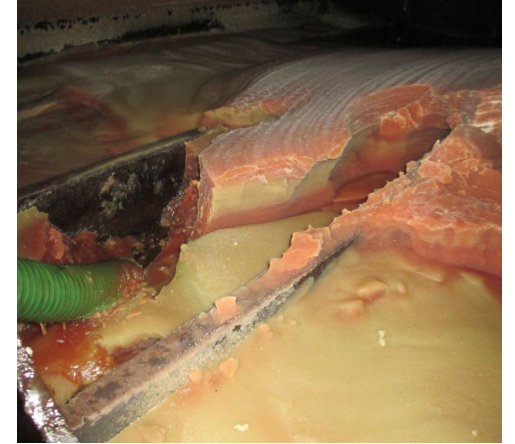
Treating cold flow properties:

- CFPP or CP is known ➡ Keep the fuel above CP or use it before the ambient temperature drops below CP.
- CFPP/CP is unknown ➡ Rule of thumb is to keep fuel at least 10°C above the PP, but not higher than 40°C.
- If filters blocked ➡ Heat them up (tracing).

The conondrum with FAME:

Heating will accelarate the oxidation process

HVO treatment in the separators

Separators – both traditional purifiers as well as automatic separators - are typically designed for densities higher than 800 kg/m3.

Traditional purifiers
The 'largest' available gravity disc can be too small
The purifier will act like a pump – not cleaning anything
Solutions
Verify with the purifier supplier if it is possible to run on HVO – is the gravity gravity disc that is 'large enough' to properly process HVO
Set the purifier up as a clarifier with the clarifier disc. Warning: Water removal limited.


Automatic separators
If water is present in the tank and is caught in the separator, it will not reach the water removal device if fitted (paring tube/heavy phase paring disc).
Alarms will occur if the heavy phase isn't pressurized or if water cannot be removed.
Solution
Set the system up as a clarifier – program modification may be needed.

Investigations into Biofuels
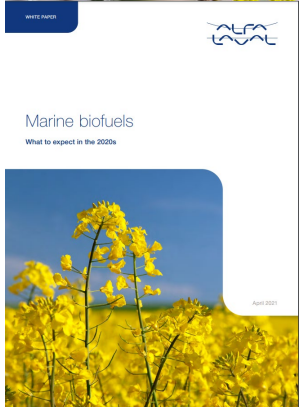
- BTL – Biomass to Liquid is being researched in the Alfa Laval Marine Test Center in Aalborg. Preparations are ongoing.

- Various small scale laboratory tests for the suitability of the current equipment with FAME blends have been carried out, and various field trials are ongoing. The results are very promising and improvements are made over and over again.

- Alfa Laval has produced a Whitepaper on Biofuel which can be found at www.alfalaval.com/fuelline

Thank you very much for your attention

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Alfa Laval

Don't just comply – be a step ahead