

Introduction

From January 1st 2020 a reduction of the global limit for sulfur in the fuel from 3.50% to 0.50% is mandatory. Options for operation in global waters are:

- Operation of diesel engines with maximum 0.50% sulfur in the fuel.
- Operation of dual fuel engines in gas mode.
- Operation of diesel engines with a fuel containing more than 0.50% sulfur and install an after treatment, for example a Scrubber.

Expected properties of VLSFO (Very Low Sulfur Fuel Oil) and ULSFO (Ultra Low Sulfur Fuel Oil)

- The compatibility with other fuels will be more critical and incompatibility among different fuel batches will be more frequently.
- The intrinsic stability of the newly appearing fuels is not yet known and may lead to issues.
- Cat fines may also be found in VLSFO like in HSHFO (High Sulfur Heavy Fuel Oil) and ULSFO.
- The pour point will probably be higher than it is at normal fuel, especially paraffinic ULSFO and VLSFO might have a higher pour point and hence poor cold flow properties. Generally, the Fuel must be kept in the system at least 10 °C above the pour point.
- An increase of aromatics can influence the ignition delay and combustibility negatively. Parts of the combustion chamber and in the direct vicinity such as inlet valve seats and piston rings are to be inspected accurately and regularly.

Action Code: When convenient

Fuel 2020

Global Sulfur Limit

MAN Energy Solutions

PrimeServ Customer Information

PCI No. 406 / September 2019

Concerns

Medium-speed four-stroke engines produced by MAN Energy Solutions



Bunkering and storage

- It is important that the most recent issue of the ISO 8217 is fully part of bunker agreements. The written clauses, especially clause 5 protects you from bad bunkers or gives you further opportunities.
- Tanks and pipes cleaning: The HFO deposits are containing a high amount of sulfur and cat fines, the VLFSFO and ULSFO may have a “cleaning effect” on those deposits , dissolve them and transport them towards the engine.
- Tank management: The mixing of fuel oils from different batches and different types of fuels must be avoided as much as possible. Storage, settling and service tanks should be emptied to the minimum to avoid fuel mixing. A good option to achieve this would be, if every different batch has its own dedicated storage tank with separated fuel lines including corresponding settling and service tank.
- The mixing of fuels can lead to precipitation of asphaltenes, those can agglomerate as sludge that might block the filter and harm the engine. For the case that fuel separation is not possible the fuels intended to mix must be fully compatible. Test methods:
 - o ASTM D4740 (“Spot Test”): Fuels are preheated, mixed and dripped as a droplet on testing paper (easy and quick but not precise enough).
 - o ASTM D7060: Optical detection. This method is available in the MAN PrimeServ Lab and is considered as precise

Separator / Fuel oil treatment

- Temperature should be as high as possible (for HFO usually 98°C). The fuel oil temperature at separator has to be maintained at minimum 98° C for a sufficient cleaning. In case of fuels with very low viscosities a reduction of inlet temperature might be required, respectively considered.
- A reduction of separator flow or parallel operation of two separators increases the cleaning efficiency remarkably. This procedure is especially recommended to face fuel oils with high level of cat fines.
- If the density of the fuel changes, the older generation of separators needs to be adapted with another gravity disc, modern separators are self-adjusting.
- The additives typically address combustion, lubricity and cold flow properties. However, there is no general proof of principle as fuel quality is too diverse. During warranty period, the use of second market additives is prohibited.

Combustion in Diesel Engines

- Fuel with an ECN (Estimated Cetane Number / acc. to IP541) below 20 is critical in low load operation.

Further considerations

- Valve seat lubrication: less sulfur -> less ash building elements like Vanadium or Nickel -> increased wear -> valve seat lubrication is necessary.
- Nozzle cooling water: In general not required if the fuel complies with the ULSFO or VLSFO grade of the recent ISO 8217.
- Sealing oil, if applicable:
 - o Is required when the engine is running on distillate fuel
 - o Is not required when the kinematic viscosity of the fuel is above 10 mm²/s (at 50°C)
- Leakage fuel lines: a heating of the leakage fuel lines may be required to prevent them from clogging.
- Lube oil selection: It is of absolute importance that the chosen base number (BN) is suitable for your operation pattern refer also to the PCI 398 (possible impact of the IMO 2020 sulfur cap on four-stroke engines).

Aftertreatment

- The combustion of specific fuels can lead to deposits on the SCR, these can decompose at elevated temperatures (350°C – 400°C).

The new introduced fuels may have distinct effects of the combustion process such as increased ignition delays and incomplete burning that can lead to increased risk of deposition formation on the catalyst

For more detailed information please refer to the attachment.

- Fuel 2020 Global Sulfur Limit – Overview of measures for fuel oil system
- Fuel 2020 Global Sulfur Limit – Comprehensive
- Further information's would be available over:
 - o Flyer: Operating fluids checkup
 - o Flyer: eLearning engine fluids
 - o PCI 390 – Hydraulic Check-Up

PrimeServ Customer Information

Contact

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Please forward this information to your technical operating personnel and remember to inform us of the current operating hours of your MAN Energy Solutions engines.