

## Are you purifying or just pumping?

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Gard regularly sees casualties involving engine breakdowns due to excessive wear caused by abrasive particles in the bunkered HFO. There have been an increasing number of HFO deliveries with higher levels of catalytic fines. This is thought to be due to the introduction of the low sulphur fuel requirements in parts of the world, and is probably a result of the production/blending processes used by the refinery industry to satisfy the demand for such low sulphur fuel. The current international standard for HFO to be used in marine diesel engines and boilers is ISO 8217:2005. But even where the HFO received onboard satisfies these requirements, operational problems may occur if the HFO separators are not properly operated and maintained.



HFO contains catalytic fines such as aluminium and silicon oxides, which are remnants from the refining process. These are hard abrasive particles, and ISO 8217:2005 regulates the amount of catalytic fines permitted in HFO, expressed as Al+Si, to 80 mg/kg (ppm). However, due to the abrasive nature of these particles, most engine manufacturers limit the amount of catalytic fines in the fuel injected into the engines to 15 mg/kg. Excessive wear of the components in the combustion chamber (piston grooves, piston rings, cylinder liners) and of the fuel injection equipment (fuel pump plunger and barrel, fuel injection valves), will be the consequences of exceeding the level of catalytic fines of 15 mg/kg. In order for the HFO separators to efficiently reduce the level of catalytic fines and other impurities that can be present in the fuel oil, such as rust, sand, dust and water, the following precautions should be taken:

- 1. Keep the HFO inlet temperature at 98°C**

The efficiency of the separator is highly dependent on the inlet temperature of the fuel, and the preheaters are often too small, the set point is wrong, or the preheater is fouled or in other ways defect, resulting in an inlet temperature which is too low.
- 2. Use of correct flow ratio**

The longer the fuel oil is present in the separator, the better the cleaning of the fuel oil will be. Since the 1980's, separators without gravity discs have been more or less standard, and it is recommended to always use all available HFO separators and to run them in parallel, with corresponding feed rate. If the separators are of the manual type with gravity discs, they must be operated in a series with a purifier followed by a clarifier, but with the lowest possible flow.
- 3. Maintenance**

Maintain the separators according to the manufacturer's instructions and using the manufacturer's approved spare parts only. Regular checks of the separators by the manufacturer's service engineers will also enhance the quality.

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**4. Check fuel system efficiency**

In order to check the efficiency of the fuel system, it is recommended that samples are taken of the fuel oil before and after each separator at intervals of 4 or 6 months. The samples should be sent to an established fuel analysing institute for analysis, and the result will provide an indication of the efficiency of the separators. The analysis will be most accurate if performed once it is confirmed that a certain amount of cat fines are present in the bunkered fuel oil. Above 25-30 mg/kg is preferable.

**5. Clean storage, settling and service tanks**

Large particles will settle in the storage, settling and service tanks, and over time the concentration of abrasive particles in the bottom of the tanks can be excessive. During rough weather these components can be whirled up and be supplied to the separators, sometimes in concentrations above the 80 mg/kg limit. Hence, these tanks should be drained and cleaned at regular intervals. It is therefore beneficial to run all available separators, even where the fuel used initially has a low level of catalytic fines.

**6. Train responsible personnel**

Ensure that personnel responsible for the operation and maintenance of the separators are properly trained and are familiar with the equipment and how to perform the regular maintenance. This increases reliability, and reduces the consumption of non-wear parts.

It should be mentioned that companies such as DNV Petroleum Services and Lloyd's Register (FOBAS) offer fuel management services that can assist shipowners in efficiently running onboard fuel treatment systems.

By following the above, the fuel treatment system should operate with optimum efficiency, which will increase the likelihood of the engines having an acceptable level of wear, which again will lead to the intervals between overhauls being as specified by the engine manufacturer.

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