

KISH P & I LOSS PREVENTION CIRCULAR KPI-LP-57-2012 **(Guidelines for Handling & Treatment of Fuels on board)**

➤ **Why the matter is so important:**

Between storage and combustion, the fuel must be transferred, heated, filtered and purified in order to meet the engine manufacturer's specifications. Depending on the quality of the fuel delivered on board, this can be a complex process and regular engine breakdowns and operational problems caused by poor fuel quality or poor fuel treatment on board. Many of such engine breakdowns arise from the use of heavy fuel oil (HFO) and the number of cases where engine damage is caused by catalytic fines seems to be in the majority. There have also been engine problems caused by mixing of incompatible fuels and filters clogged by sludge.

Many engine breakdowns cause near misses & accidents as well as off-hires and financial losses. The insurers are burdened with various claims; third party liabilities & related issues of concern.

The aim of these guidelines is to remind ship owners and operators of important issues regarding fuel handling and treatment on board and to highlight the importance of structured training of crew members to prevent operational problems and engine damage.

➤ **Progressive Amendments to rules and regulations:**

Permissible levels of sulphur oxide (SO_x) emissions are regulated through MARPOL Annex VI and various domestic regulations. The sulphur content limit for LSFO allowed therefore depends on the location of the ship and the regulations in force at the time. At the this time(third quarter of 2012), the maximum sulphur limit of fuel oils used outside emission control areas (ECAs) and other designated areas is 3.5%, while inside ECAs the limit is 1.0% (ref. IMO MARPOL Annex VI).

Identified designated areas other than the MARPOL ECAs are: EU Community ports (0.1%), Turkish ports (0.1%) and California coastal areas [1.0% for marine gas oil (MGO) and 0.5% for marine diesel oil (MDO)].

The approach towards the use of low sulphur fuel oils (LSFO) is causing fuel refining processes to change, sometimes resulting in lower quality HFO being delivered to ships. More blending of different oil components to optimise sulphur content may create side effects such as instability, incompatibility, ignition and combustion difficulties and an increase in the levels of catalytic fines. The need for frequent changeovers between different types of fuels clearly increases the opportunity for errors & chance of

making mistakes. Therefore, it is very important that the crew be familiar with the properties of the fuel supplied and the limitations of the particular ship's fuel treatment plant.

➤ **Sediments & Sludge in the Fuel oil storage tanks:**

Even if fuel is within specification, problems can arise at the very first stage of storage. Build-up of sediment inside the tanks can cause contamination of new fuel and mixing of different batches of fuel can lead to unstable fuel. Important precautions are:

- ✓ To regularly clean storage and settling/service tanks. Large particles will settle in the tanks and these particles can be whirled up during rough weather and supplied to the separators, sometimes in concentrations above the limits set out in ISO 8217 (which specifies the requirements for petroleum fuels for use in marine engines and boilers prior to appropriate treatment before use) Cleaning of fuel oil tanks is often only performed during scheduled yard stay and the implementation of routines for more frequent cleaning should be considered.
- ✓ To regularly drain settling/service tanks to remove water and sludge, preferably on a daily basis.
- ✓ To place new bunkers into empty tanks whenever possible. Be aware that mixing of two stable fuels does not guarantee a compatible mixture and the sediment potential can increase drastically after mixing.
- ✓ If mixing cannot be avoided, carry out tests to ensure that the two types of fuel are compatible. Use a fast, reliable and recognised testing service to analyse fuel samples and avoid using the new fuel until the analysis results have been reviewed. Carefully adhere to the recommendations provided with the results from the test laboratory.
- ✓ Where time is a critical factor but there are doubts about the compatibility and sediment potential of a mixed fuel, carry out the simple on-board test (test kits for this purpose should be available on board) as a minimum, and avoid using the mixed fuel during critical

operations or when navigating in restricted areas.

- ✓ To consider if bunkering upon entering a port is an option (draught restrictions, cargo, timing, etc., permitting) instead of when leaving a port. This will allow analysis of the new fuel to be available prior to leaving port, which of course is the ideal situation.

➤ **Using Purifiers & Separators for Fuel Oils:**

Even if the HFO received complies with the requirements of ISO 8217, operational problems can arise if the treatment plant and in particular the HFO separators are not properly operated and maintained. In order to efficiently reduce the level of catalytic fines and other impurities present in the fuel, such as rust, sand, dust, salt and water, separator manufacturer's recommendations should be followed.

Important precautions are:

1. To keep the HFO inlet temperature at 98 degrees C. The efficiency of the separators is dependent on the inlet temperature of the fuel and even a small reduction in temperature will reduce the quality of the separation. Some commonly observed causes of failures are leaking heating oils, wrong set points for temperature sensors and defective monitoring systems.
2. To use the correct flow ratio and gravity disc. The longer the fuel is in the separator, the better the cleaning of the fuel oil will be. For separators without gravity discs, it is recommended to always use all available HFO separators and to run them in parallel, with a corresponding feed rate. If the separators are of the manual type with gravity discs, they must be operated in series with a purifier followed by a clarifier, but with the lowest possible flow. On this type of separators, the use of correct gravity discs is crucial and the discs have to be changed depending on the density of the fuel used.
3. To maintain the separators according to manufacturer's instructions and, as far as practically possible, use manufacturer's approved parts only. In addition, the separators should be checked by the manufacturer's service engineers at regular intervals. One commonly observed causal factor for failure is incorrect assembly of the separators after cleaning.

4. To verify the efficiency of the separators and the cleanliness of the service tank by sampling the fuel in the system before and after the separators and as close to the engines as possible. Send the samples in for analysis by a recognised laboratory. Verification of separators should be carried out at least once per year.

➤ **Changing-over from one to another type of Fuel Oil:**

Ships that trade between areas with different sulphur limitations should have detailed changeover procedures. Insufficient knowledge of the actions required in a given situation may result in engine failure, so changeover procedures should be practiced before entering restricted waters, especially in ships that do not perform fuel changeovers on a regular basis. The risk of incompatibility when mixing HFO and low sulphur distillates, or even marine gas oil (MGO), can be high and requires increased awareness.

The junior engineers may not be experienced enough to be taking care of these operations. Assessment of the risk involved should bear this in mind & adapt measures such as training & familiarization sessions & need for proper supervision & management for protection & avoidance of unwanted situations.

➤ **Summary:**

For the safety of the crew, ship and cargo, and to minimise costs and periods of off-hire caused by engine breakdowns, it is important that ship owners and operators focus on the quality of fuel handling and treatment on board.

All engine crew must receive proper and regular training and it is particularly important to ensure that junior engineers become familiar with the ship's fuel treatment equipment and how to perform regular maintenance.

Changes in rules and regulations may lead to changes in procedures so training and facilitation of experience-exchange are essential for the crew to be able to detect the cause of a fuel-related problem when it occurs, and adjust the fuel handling and treatment procedures to minimise potential losses.

The ship managers & operators must provide adequate means for dissemination of information & new requirements & conduct ship & shore based briefing & updating for all those involved & affected by the various amendments.