

Onboard fuel storage, treatment and handling



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Introduction

We are offering this technical topic to help explain ISO 8217, which stipulates acceptable characteristics for marine fuel oil products. This specification goes a long way to verify that fuel of a proper quality is being supplied to vessels. However, this is only the start of a broader process to ensure that fuel consumed in onboard equipment meets specific needs. Other parts of this process include onboard fuel storage, handling and treatment.



Fuel storage

To maintain fuel condition when stored in a marine environment, certain housekeeping actions are required:

1. A number of factors can contribute to water accumulating in onboard fuel storage tanks as a result of moisture generation. For example: ambient humidity, temperature difference between tank internals and the ambient air where venting occurs, movement of the vessel, leaking heating coils, etc.

Water that is allowed to remain in fuel tanks may support the growth of bacteria at the oil-water interface. This bacterial growth can find its way into the fuel system and clog filters or purifiers. Water that accumulates in tanks may also pass into the fuel system, damaging machinery or leading to faulty downstream operations. It is important to ensure that all fuel tanks are drained at least daily for accumulated water. On some vessels, and in certain conditions, tanks should be drained more frequently.

2. Sediment is another contaminant that may be found in onboard fuel tanks. Sediment can comprise dirt, rust and scale from pipelines and storage tank internal structures, as well as arise due to ineffective vent screening. For safety reasons, all fuel tank vents should have a properly sized and well-maintained mesh screen in place at all times, such that debris is prevented from entering tanks. Although the fuel may meet or exceed ISO specifications, some sediment may be entrained within the fuel.

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3. Catalytic fines (cat fines) are similar to sediment in that the fuel may meet the conditions laid out by the ISO specification, yet may still contain some cat fines. These cat fines must be reduced to appropriate levels to enable reliable consumption of the fuel by diesel engines and other machinery.

Fuel storage, settling and service tanks onboard vessels all serve to settle water, sediment and cat fines from fuel. Settling tanks are specifically designed to support the settling process through tank design, including sloped tank bottoms. Personnel should maintain the proper temperature in tanks to aid the settling process, i.e., storage tanks maintained at least 10 degrees Celsius above the pour point, and settling tanks at 85°C.

Water drainage further enables cat fines settling, since cat fines readily emulsify with water and thus will not settle out when water is present. If available, the use of two settling tanks will increase settling time. Tank bottoms should be cleaned on a regular basis to remove accumulated settled material. If not removed, this material may clog pump suctions, block sounding tubes or find its way into the fuel system.

Fuel treatment

Treating fuel onboard may comprise a number of different processes, including the use of strainers, filters, purifiers and clarifiers. Fuel systems are designed to treat fuel from initial handling to end use. At one end of the fuel preparation process, fuel transfer pump suction strainers may have a 30-by-30-mesh size, while self-cleaning filters just ahead of the main engine may have a 5 micron filter screen. Strainers should be kept clean and wire mesh in good condition. Strainer baskets or screens should only be replaced with units of the same sized mesh per original design.

It is also important to keep the fuel at the proper temperature such that pressure drop across filters will be kept to within design limits. Self-cleaning

filter operations should be checked to ensure that the filter is being cleaned on a regular basis, though not so frequently as to lead to excessive oil being lost. Small-micron filter mesh in self-cleaning filters can become clogged with cat fines over time that cannot be automatically back-flushed. In these cases, if the screen openings cannot be maintained and the pressure drop across the unit is too high, the filter has to be manually cleaned or replaced.

Onboard personnel should ensure that purifiers and clarifiers are operating as per manufacturer's specifications and that the appropriate fuel temperature and bowl speed are maintained to enable proper separation. Maximum efficiency of machines can be attained by maintaining lowest throughput through the separators. Operating purifiers in parallel, where possible, will also increase the overall purifying effect. Sound purifier operation has the single largest overall impact on onboard vessel fuel treatment.



Fuel handling

Onboard handling of fuel generally refers to the process by which the fuel is pumped, heated and transferred to equipment where it is needed, via either the fuel transfer or fuel service systems. Providing fuel at the correct temperature, pressure and viscosity is essential for machinery to operate properly. Additionally, equipment efficiency will be adversely affected if the fuel is not supplied with the necessary characteristics. Fuel heaters should be cleaned on a regular basis to ensure proper operation. Instrumentation such as pressure, temperature and viscosity control systems should be calibrated and set up for the appropriate equipment requirements in order to obtain optimal results.

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