



# PREVENT EMERGENCY EQUIPMENT FROM FAILING DURING AN EMERGENCY



# Prevent Emergency Equipment from Failing during an Emergency

Most companies and vessels have routines in place to regularly test and try out emergency equipment. However not much attention is being paid to the quality of fuel being used for emergency equipment like emergency generators, life boat engines and emergency fire pumps.

Grade DMX in the ISO 8217 specifications is intended for fuels used for emergency equipment. However since this is not a mandatory requirement, marine gas oil (MGO Grade DMA) used for other purposes onboard is often used to fill up the emergency equipment storage tanks.

This can have dangerous consequences as the DMA grade fuels may not be "fit for purpose". The quality of the fuel in the emergency equipment storage tanks may also deteriorate during storage. Hence it is essential to test and ensure that the quality of the fuel being taken into the tanks is fit for purpose and monitored at regular intervals.

## IMPACT OF VARIOUS PARAMETERS ON THE OPERATION OF EMERGENCY EQUIPMENT

Cold Flow Properties (Cloud Point and Pour Point)

The Cloud Point (CP) of a distillate fuel is the temperature at which wax or other solid substances begins to separate from petroleum oil and form a cloudy appearance.

Pour Point is the lowest temperature at which the fuel will flow.



The Pour Point can be lowered using additives while the Cloud Point is not affected by additives. This means that even though a distillate has a very low Pour Point the Cloud Point could be very much higher. When the fuel temperature drops to or below the Cloud Point, wax crystals start to form, filter clogging takes place, resulting in fuel starvation and engine stoppage. Satisfactory storage, transfer and filtration needs a fuel temperature about 3-5°C above the Cloud Point. The Cloud Point of fuels used for emergency equipment should be below the ambient temperatures the equipment is operating or likely to operate in.

In a recent case, fuel in a life boat engine storage tank had a Pour Point of -33°C while the Cloud Point was +17°C. This fuel can only be safely used at ambient temperatures above 20°C.



Filter blockage due to high Cloud Point

The additives used can also cause operational problems as some of the chemicals get absorbed by filter materials, causing them to appear blocked. This problem is exacerbated for emergency equipment which are typically fitted with very fine filters.

**Fatty Acid Methyl Esters (FAME)** - Due to the practice of blending FAME into automotive diesel and heating oil, it is almost inevitable that some distillates supplied in the marine market contain FAME. FAME can lead to complications with respect to storage and handling in a marine environment, due to its oxidation tendency, long-term storage issues, affinity to water and risk of microbial growth, degraded low-temperature flow properties and FAME material deposition on exposed surfaces, including filter elements.



**Visual Appearance** - Fuels grades DMA/DMZ/DMX should be bright and clear. If the fuel is hazy, it could indicate the presence of water or a high Cloud Point. Haziness could also indicate poor oxidation stability.

**Cetane Index** - A low Cetane Index may lead to starting difficulties at low ambient temperatures.

**Sulphur Content** - Vessels (including emergency equipment) required for securing the safety of a ship or saving life at sea are exempted from the Marpol Annex VI Regulation 3.1.1 Sulphur requirement. However for the testing of emergency equipment in an Emissions Control Area (ECA), compliant fuel with sulphur content less than 0.1 %/m should be used.

## FUEL CONTAMINATION, A POTENTIAL HAZARD

Since fuels in the emergency equipment storage tanks remain unused for long periods of time, quality of such fuels may deteriorate due to the following:

**Water** can originate from contaminated fuel or condensation, and engines may not run because of water in the fuel lines. The presence of water can promote growth of microorganisms such as bacteria, yeast and fungi, and can also lead to blockage of fuel lines and filters due to icing when ambient temperature drops below 0°C.



**Microorganisms (bacteria, yeast, fungi)** - Given the correct conditions in fuel storage systems, micro-organisms can grow and multiply. Bacteria, fungi and yeast are living organisms which may be present in fuel storage tanks and in particular where water is allowed to build up. Distillate fuels are more prone to bacterial infection. Microbial infection can lead to slimy deposits in tank bottoms, plugging of filters, pitting corrosion on fuel tank bottoms or at oil water interface and injector fouling.

**Gas Oil Stability** - Many different chemical reactions can cause a gas oil to be unstable. Instability can lead to sedimentation and eventually to the formation of gums. Instability is usually indicated by a colour change over a period of time.

## MITIGATE YOUR EMERGENCY EQUIPMENT RISKS

It is thus obvious from the above reasons that engines, which should be the most reliable, may fail to operate when they are most needed. Knowledge of fuel quality and management that goes beyond adherence to imperfect specifications is necessary to help operators deal with fuels that may meet the specification numbers but give serious operational problems.

**Do not wait for an emergency to happen. Contact your nearest VPS office now!**



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