

DIRTY FUEL TANKS

by Pat Manley

Recent changes in the EU/UK supply of fuel regulations have made it more likely that we will suffer fuel contamination of our diesel fuel and fuel tanks.

In the past, our marine diesel fuel has basically been 'central heating' oil, which although it has good storage properties, doesn't contain the performance enhancing additives of 'road fuel'.

The new legislation requires the supply of low sulphur diesel fuel where it is to be used on 'Inland Waterways'. The definition of inland waterways included estuarial waters such as the Solent. Low sulphur diesel presents no threat in itself, provided that the refineries have added a lubricity enhancer, which they will have done. The most cost effective way for fuel distributors to supply marine fuel to refuelling stations is to bring in road diesel fuel.

At first sight this seems a good thing because this fuel probably has all the additives that make our cars run well. However current UK/EU legislation requires all road fuel to have at least 5% bio-fuel content and this is where the problem lies. This blend ratio is set to rise and is in some cases now at least 7%.

As far as we leisure boaters are concerned this blend of bio-diesel presents a problem - the fuel deteriorates quite rapidly in storage and it is hygroscopic i.e. attracts moisture. Normally the advice has been to keep our fuel tanks full, especially before laying up for the winter to minimise the amount of air in the fuel tanks. Thus when the outside temperature falls there is little moisture to condense out of the air and into our fuel tanks. But, the new fuel doesn't keep very well so we shouldn't refuel until we need it because the fuel will go stale, BUT the more air there is in the tank the more water will accumulate - a Catch 22 situation.

So what's wrong with having water in the tank?

Because water is heavier than diesel, the water collects at the bottom of the tank. Bacteria and fungi can grow in our fuel tank, all they need is diesel fuel and oxygen. They get the oxygen from the water. The bugs grow at the interface between the oxygen and the water at the bottom of the tank and the problem is worse when the boat is static for long periods of time. Fuel contaminated by 'Diesel Bug' can block fuel filters rapidly enough to stop our engines when underway. Also, some variants produce sulphuric acid which can seriously harm our fuel system.

Additionally, bio-fuel (ethanol) is a solvent. The effect of this is that it will dissolve old deposits in the fuel system, causing blockages and also the resins of a GRP fuel tank causing leaks or worse. It can also cause failure of rubber components in old engines.

So what can we do?

PREVENTION

We should do all we can to prevent water in our fuel tanks.

This entails refuelling at known reliable sources, ensuring that our fuel tank filler seal is in perfect condition and keeping our tanks topped up, especially in the winter. In some areas of the world fuel may contain both dirt and water, so using a filter that removes both may be used when refuelling. However, this slows down the refuelling rate and will not be popular with the seller or waiting customers.

Remember that diesel bugs can't grow without water. You could use an additive which takes the water into suspension, passes it through the engine and into the exhaust. These are used successfully in the road haulage industry but I personally have reservations about using them where the engine is used infrequently as in the leisure marine environment. In this case there is water in suspension in the fuel injection pump and injectors for long periods at a time with the attendant risk of severe internal corrosion. An Aqua Sock (A.S.A.P. Supplies) can be suspended in your tank for 24 hours to remove water. Ensure that the air inside your tanks is dry, especially when your boat is laid up. This could be achieved, DIY, by attaching a plastic bag to

seal the tank's breather pipe allowing the air inside to expand and contract without drawing in damp air.

Prevent our fuel from becoming stale. Don't use bio-blend fuel if you can avoid it. Premier and MDL marina groups have an arrangement with their suppliers to provide only non-blended diesel fuel. Use an additive which will help alleviate the effects of using blended fuel. As far as I am aware, there are two of these available, one from Soltron and the other from Millers.

Prevent a diesel bug from becoming established. If there's no water, the bug can't grow. You don't need a biocide as a regular additive.

HOW DO WE KNOW IF WE HAVE DIRTY TANKS?

The first sign that you may have is that the engine will stop. If your primary filter has a transparent bowl, then you will see dirt and water in this when you check it. Some filter elements, such as Racor, do not allow water to pass through. However, because the fuel take-up pipe is several centimetres above the bottom of the tank (to prevent picking up muck from the bottom) you can have a contaminated tank long before the contamination becomes visible. Where tank access hatches are provided, their removal will allow the tank walls and bottom to be inspected. You could try sucking out some fuel from the bottom of the tank via the fuel filler pipe, but this may be impracticable. Some laboratories will analyse fuel samples and a DIY test kit is available, although I have no knowledge of its effectiveness.

WHAT IF WE HAVE GOT THE BUG?

Kill the bug. This is the time to use a biocide, but the biocide won't get rid of the dead bodies. When individual bugs die, as they do all the time, they fall to the bottom of the tank and this is the visible sign of an infection and is what blocks the filters. An enzyme additive, such as Soltron will remove this type of tank contamination and is indeed used for this purpose in large fuel installations. This type of additive is used at each refuelling to keep the tanks clean and also imparts, over a period of time, immunity from infection. Unlike biocides, it poses no health and safety risk.

Clean the tank. This can pose a large problem for boat owners. To clean the tank you need to be able reach all surfaces within the tank, and many tanks these days have no inspection hatches, neither can the tanks be removed for cleaning or replacement. Even with tank hatches, tank baffles may prevent all the surfaces from being reached.



Left: Diesel Bug Buster's equipment on the dockside - small enough to visit you on your pontoon. Right: Express Lube's portable rig is bigger and you may have to move your boat to the dockside.

TANK CLEANING AND FUEL POLISHING SPECIALISTS.

There are a number of companies which will come to your boat and clean the tanks and polish your fuel removing both solid contaminants and water. 'Polishing' implies returning your dirty, stale fuel to a clean, fresh condition. In the UK, there are several companies that offer this service, usually via local franchised operators.



For dockside use, Express Lube has a Van mounted rig.

A powerful mains-electric pump is used to suck the fuel from the tank, pass it through a filtration system and return the filtered fuel back to the tank. Provided that there is a tank access hatch, a wand attached to the suction hose should be used to sweep the bottom of the tank to remove accumulated sludge and dirt. In the case of aluminium tanks this wand must be non-metallic. The cleaned fuel is returned to the tank via a second pipe. Once the bottom of the tank has been swept, the delivery and return pipes should be positioned to give maximum turbulence inside the tank to ensure all the contamination is removed. Where no tank access panels are available, thorough cleaning is more difficult. Other than the contaminants themselves, all the fuel is returned to the boat's tanks.

I have observed two different systems being used, both requiring 240 volt mains electrical supply.

The first, operated by Darthaven Marina using Express Lube equipment, was a fairly large unit, mounted on four wheels that can be positioned on the dockside or pontoon provided there is sufficient access. This uses a turbine centrifuge prior to the filter and the centrifuge separates the sludge and coarse contamination from the fuel before it reaches the filter, thus ensuring that frequent filter changes are not required. A vacuum gauge indicates how dirty the filter is becoming.

The second was operated by Diesel Bug Busters. This was a much smaller unit that can be carried to the pontoon so access was not a problem. If the tank is very dirty, the machine's filter will become blocked very quickly and as these filter elements cost around £80 each, they first used a metal 50 micron washable filter for the first passes through the machine. The fuel flows through transparent bowls where some of the sludge is deposited prior to reaching the filter and these bowls will need regular emptying. After a number of passes through the system, the fuel will be free of major contamination and the metal filter element can be replaced by the disposable 30 micron element to fully clean the fuel. If this is done too soon, this expensive filter will quickly become blocked and must be replaced by a new one at the boat owner's expense.

The boat owner needs to discuss with the operator what the service will provide according to the design of the fuel tanks and if the boat will have to be moved first. Generally a boat's primary fuel filter will have a 30 micron mesh size, though some are smaller. The polishing will need to clean the fuel to at least 30 microns to prevent premature blockage of the boat's filter.

DIY FUEL POLISHING - once the tanks have been thoroughly cleaned, if necessary.

You can install your own fuel polishing system, and this is particularly worthwhile on larger boats. This can be a permanently installed system that recirculates fuel from the tank, through the polishing system and back to the tank independently of the engine's normal fuel system. This can run all the time the engine is running if required. Alternatively, for smaller boats, boatowners can use a portable system once or twice a season.

WHAT YOU CAN EXPECT TO PAY

Diesel Bug Busters charged £450 with no VAT payable, to attend and clean a 120 gallon tank and polish the fuel. If more than one replaceable filter is needed they will charge an additional £80 for each filter. They will take several hours (as long as necessary) to achieve the required result.

Darthaven Marina, using Express Lube equipment charge £60 + VAT an hour, at Darthaven, including the machine, so the cost will depend on the amount of fuel to be cleaned and how dirty it is.

Express Lube, who will visit your boat in your marina says: "Every boat has its own complications so the price per job tends to fluctuate accordingly due to the amount of work required in gaining the required access to the tanks, a typical (no dramas) job from £400 + Vat for a single tank on a yacht or small motorboat in the Southampton/Solent area and can filter down to 5 or ten microns with extra passes if require at no extra charge for filter changes."

A.S.A.P. Supplies will sell you the parts to make up a portable polishing system for less than £200, depending on the fuel flow required. A fully installed system will cost quite a lot more, again depending on the fuel flow required. These will polish the fuel but not clean the tank.

A SAILOR'S STORY



Top: The muck collects in the equipment's filters as the fuel is pumped through. Bottom left: This is some of the muck that came out of Gareth's tank. Bottom right: Express Lube will make access panels in your tanks if none are available.

Gareth took his aluminium 38 ft. sailing boat across the Atlantic in 1992. In Canada in 2004 he had his tank cleaned and the fuel polished using a filter only system as a precautionary measure. The operator got through four filters before he gave up. Gareth doesn't use any fuel additives but does use a 'Baja' filter to remove dirt and water when refuelling. He has refuelled in many out-of-the-way places in North America, South America and the Caribbean and having a very large tank (1000 mile range) the fuel gets stale.

This year, back in the UK, Gareth removed his tank's two access panels and found severe contamination with diesel bug. Access to the dockside is restricted, so he employed Diesel Bug Busters to attend with their very portable equipment to clean his tank and polish his fuel. What came out of his tank will alarm other boaters!