

# Diesel Bug

## Exciting questions and answers on these annoying little organisms.

Diesel bug is the boating name given to the organisms that form slimes in diesel fuels. Diesel bugs are in fact microbial organisms and come in three main varieties where fuel spoilage is concerned.

### What are they?

#### Bacteria

The most common species are Pseudomonas, Klebsiella, Micrococcus, Arthrobacter, Flavobacteria and Acinetobacter.

#### Yeasts

These include the Candida, Saccharomyces and Hansenula families.

#### Moulds

The most common moulds are Cladosporium resinae (The name used until it was changed to Hormoconis resinae) and Aspergillus fumigatus.

This list is only a tiny part of what can occur and indeed the bacteria also exist as aerobic and anaerobic. The aerobic ones require oxygen and the anaerobic do not. The latter produces by-products that can eat holes in half inch steel plate and give off bad-egg smelling, toxic gas.

### Where do these organisms come from?

Generally the microbes get to your boat through the fuel distribution network but they may enter through airborne particulates. These organisms like still fuel and temperatures between 5°C and 70° C. Around 30°C is ideal for growing organisms and they multiply extremely quickly.

If fuel is changed in the holding tanks on your boat, at the fuel berth or at the distribution it has been believed that this will prevent diesel bug proliferation. This is quite so in the tanks themselves as the bugs do not get the conditions to reproduce. Once they reach the boat tank however and it is not moved for a week or so they happily set about multiplying.

### What do they feed on?

The micro-organisms feed on water, hydrocarbons and nutrients in the fuel. The water only needs to be available at 100 ppm in the fuel for bacterial growth to occur. The water is present in the tank from within the delivered fuel and from condensation. You will be familiar with draining this off from your water separator on a regular basis. The hydrocarbons come from the fuel itself and the other nutrients from the fuel additives required for the fuel to perform to the required standards.

### What problems do diesel bugs cause?

The most obvious visual sign of microbial activity is the formation of sticky, slimy, polysaccharide polymers that form strings and films. These block fuel filters and even fuel lines. They also capture particulate matter and create mats. Even if they get through the filter unit they can block the injection ports in the engine on an uneven basis giving rise to potential failure of the crankshaft due to uneven loads from the pistons.

The by-products of bacterial action are often acidic and when this settles into the water phase at the bottom of the tank, especially during lay-up it can cause corrosion of steel tanks and brass or copper fittings.

### How can I get rid of them?

Prevention is of course the best cure. As you are generally unsure of the nature of the fuel you are using continual prophylactic treatment direct to your tanks is recommended. This will prevent organism growth even though the organisms may still be present. There are two routes that can be used, biocides or enzymes. Enzymes are perhaps the more eco-friendly. These are NOT biocidal but do remove the detritus from bacterial activity allowing it to be burnt away. If there is any biocide present in the fuel enzymes will be deactivated. Care must be taken when using enzymes, as there may be some residual biocide that has been used in the fuel distribution chain. This may be insufficient to stop organism growth but may be enough to prevent enzyme activity. Enzymes are inactive at low temperatures.

Biocides are available in different types. All are harmful to aquatic organisms if spilt so care must be taken when using them. Once in the fuel they are generally burnt completely in the combustion process. With almost all biocides used for fuels there is no evidence to show organism resistance developing from continual use. Biocide use can be bacteriostatic which means it prevents growth or bactericidal which means it kills bacteria.

If there is a bad case of diesel bug in your fuel it will be necessary to treat it with a shock (bactericidal) dose of biocide followed by regular treatments of bacteriostatic quantities. The supplier will give you details.

### How do I choose a biocide?

The biocide of choice should have the following properties:

- It should: Neutralise acidic by-products (especially at lay up)
- Kill or prevent the growth of the wide range of organisms that may be present.
- Operate over a wide range of temperatures.
- Disperse into both the water and fuel phases in the tank.
- Remain active for a long period.
- Be as safe as possible for the environment and the user.
- Burn completely in the combustion process.
- Have no detrimental effects on the engine components or the combustion performance.
- The dead bugs should be in a form that is easily removed by the filter or pass harmlessly through the engine.
- Be on the Biocidal Products Directive approved list.