

DIESEL FUEL CONTAMINATION - WHAT IT IS AND HOW TO TREAT IT

INTRODUCTION

In January 2010 a new fuel directive was released by the EU (European Union) which has caused much concern among many industries. The directive requires that all Non Road Mobile Machinery including agricultural, mining, and construction equipment, and mobile gen-sets and pumps, amongst others - use only Ultra Low Sulphur Diesel (ULSD). It was the intention of this legislation to reduce sulphur related emissions, but it has had other knock-on effects. Sulphur is required in diesel to provide lubrication for the engine, without it engine components experience greater wear. Removing almost all of this sulphur reduces the lubricity of the diesel, which is currently solved by adding bio-diesel to the fuel, as it has a superior lubricity to petro diesel. Whilst adding bio-diesel solves the lubricity issue, it causes problems with fuel contamination.

WHAT CAUSES DIESEL FUEL CONTAMINATION?

Compared to petro diesel, bio-diesel has inferior oxygen stability, meaning if bio-diesel comes into contact with oxygen while in the fuel tank, it reacts with it to form peroxide. The presence of this peroxide then allows the formation of organic acids. These organic acids then, in turn, cause gums and resins to form in the fuel, a common cause of blocked engine filters. Another problem with Bio-diesel is its increased hygroscopy compared to petro-diesel, meaning that it absorbs more water. Bio-diesel can absorb upto 1500 ppm of water, much higher than petro-diesel's 50ppm, resulting in a higher dissolved water content in the fuel. As the temperature of the fuel rises and falls during engine operation this dissolved water precipitates out of the fuel. As this water is heavier than the fuel it sinks to the bottom of the tank, forming a layer of free water. This free-water can encourage the growth of diesel bug.

Other causes of contamination include poor fuel storage, bad fuel transfer and housekeeping practices, or simple human error, and can result in grit, rust, water and sand and other contaminants ending up in the fuel, which ultimately could harm the engine fuel system.

What problems does diesel fuel contamination cause?

Today's diesel engines are much less tolerant of fuel contaminants than older engines. Any contamination by water or other substance has a chance of causing permanent damage to the engine or fuel system if it gets into the engine. The presence of water in fuel injection systems can greatly increase the amount of wear inflicted on the engine and may damage it. However water in fuel tanks also causes another serious problem known as 'diesel bug'. Diesel Bug is the generic name given to the microbes that grow within fuel tanks. It is a cocktail of up to 100 different strains of bacteria, mould and

yeast. Like all living organisms they need food and water to survive. Fuel is their food and the presence of free water in the tank will allow them to thrive and feed on the hydrocarbons in your diesel. Not only does this gradually degrade the quality of the fuel, but the microbes will also produce bio-mass which will block engine filters. They also excrete acids that will, over time, corrode your fuel tank.

HOW CAN DIESEL FUEL CONTAMINATION BE TREATED?

To prevent fuel contamination from occurring, it is important to ensure your fuel is kept "clean and dry", meaning a water content no more than 200ppm (0.02%).

In order to achieve this, all major fuel suppliers and engine manufacturers will tell you the first step is "good housekeeping", i.e. keep Diesel clean and free of water.

Ways of achieving this include:

- * Ensure your fuel tanks are regularly maintained and leak-free
- * Always follow recommended tank refilling methods
- * Store fuel in a cool place, where possible
- * Keep fuel tanks as full as possible to prevent water from condensing due to humidity
- * Filter fuel whenever it is moved to remove dirt and dust
- * Employ an 'on-tank' filtration system to remove water and other contamination in the fuel.
- * Consider the use of a fuel additive to prevent fuel oxidation and a fuel biocide to minimize microbial growth. Also add lubricity additive.
- * Introduce a regular fuel testing program to check fuel for water, microbial and particulate contamination. This is very important

Hence it is extremely important for all the users to note the above requirements. Soon it is expected to be the norms in EURO V and VI requirements.