

Ultra Low Sulfur Diesel

A very big change has occurred in the diesel fuel for your vehicle. Our government mandated that as of mid June of 2006 all diesel fuel for highway use produced in the US must contain a maximum of no more than 15 parts per million of sulfur. Why is this change important?

Removal of sulfur from diesel fuel is good for the environment but the gain comes with the potential for very significant costs to vehicle operators. The process which refineries must use to take sulfur levels down from the old 500 part per million limit to the new 15 parts per million level takes away from the already poor lubricating properties of diesel fuel. It has been common knowledge since the change to the old 500 ppm low sulfur fuel back in 1993 that lubricity enhancing additives are needed to keep destructive wear from shortening the life of fuel system components caused by lack of lubrication. The new low sulfur specification is the law. The law requires use of fuel that will cause a great deal more wear and tear for fuel lubricated metal parts but the specification does not require that any lubricity standard be met. In Europe there are similar low sulfur regulations however the laws, which require sulfur reduction, also force in a reasonable standard for lubricity so that equipment wasn't damaged by the change.

Over the years there have been much higher instances of water contamination. Whenever the water manages to get past the filter/water separator system a great deal of damage is the usual result. It is inevitable that some water will be in diesel fuel. It is the job of the filter system to get the water out. If water has a chance to come in contact with expensive high pressure fuel injection components the result is accelerated wear at best and catastrophic failure in the worst cases.

We recently helped a customer with a severe case of water contaminated diesel fuel damage. An injector tip broke after being exposed to water. Too much fuel entered the cylinder and resulted in hydraulic lock of the engine and significant damage. In the interest of preventing another failure the fuel tank was removed from the truck and inspected to make sure that there was no more water waiting in the wings. When inspected, the entire bottom of the tank was found to be covered with thousands of very small water droplets. Larger "puddles" of water on the bottom of the tank are common with the majority of the water at the lowest point. This time was different. While there was a lot of water present it did not want to combine together but rather was separated with the largest "puddle" being only about ¼" in diameter.

Curious about the dispersed water, research was done on the new ultra low sulfur fuel. I have yet to find it in writing but have been told that the process of making ultra low sulfur diesel leaves more water in the fuel than in the past. I have also been told (but not found it in writing) that the fuel companies are using additives in ultra low sulfur diesel to cause the water left in the fuel to emulsify and be dispersed throughout the fuel in order to have the water pass harmlessly through the fuel system. I think the tiny fuel droplets found on the bottom of the customer's fuel tank are evidence of water that had been emulsified in the fuel and then dropped back out. It appears that some of this emulsified water made it through the fuel filter and eventually caused the broken injector. I don't know whether the fuel in question had been contaminated with some source of additional water or not. The customer was not using any fuel additive and fuel filter maintenance was very good.

I don't claim to know very much about the subject of ultra low sulfur diesel fuel. What I do know for sure about ultra low sulfur diesel fuel is as follows:

1. The cost of extra refining to make ultra low sulfur diesel fuel is part of the higher fuel prices we are paying.
2. The fuel injection industry component suppliers do not provide any warranty for damage caused by poor quality or contaminated fuel and neither do the vehicle manufacturers.
3. There are many ways that fuel can be contaminated after it is produced. This goes for ultra low sulfur diesel like any other fuel.
4. The very poor lubricity of ultra low sulfur diesel fuel means that a high quality fuel additive should be used to help avoid premature wear.
5. Use of a quality additive that helps the filtration system capture water is a very good idea.
6. Quality additives will help with lubricity, help stop the damage from water, aid in cold startups, reduce smoke and may improve fuel mileage.
7. While the effects of using ultra low sulfur diesel may not be fully understood for a number of years, it is obvious that installation of a high quality filter system, which is effective at the removal of emulsified water from diesel fuel, may be a very wise investment. A pre-filter that takes out 95% or more of the emulsified water from diesel fuel, working in a system that re-circulates the fuel like diesels do, will minimize the risk of major failure caused by water.

As time goes on I'm sure that more information on the subject of ultra low sulfur diesel fuel will be forthcoming.