

Diesel Fuel Stability

Category: Fuel Additive

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Introduction:

Many customers have expressed a desire for information and recommendations regarding the stability properties of EPA mandated low sulfur diesel fuel and the possible effects it may have on their engines and/or fuel injection systems. This fuel has been required since October 1, 1993 to have less than 0.05 weight percent sulfur (compared to 0.5% before October 1, 1993) and must also have less than 35% aromatic hydrocarbon content and a minimum cetane index of 40. The law results in a fuel documented to produce fewer particulate, sulfur dioxide and NOx emissions.

Background:

Low sulfur diesel fuel may be produced in a number of ways. Some of these methods, such as using base stocks naturally low in sulfur content, yield a fuel with operating properties undistinguishable from earlier diesel fuel. One of the most cost effective processes to produce compliant fuel from high sulfur base stocks is called hydro processing. This process involves the introduction of hydrogen in the refining process to remove sulfur and reduce aromatic hydrocarbons (olefins) to their aliphatic (saturated) forms, also improving cetane index. The stability of the fuel is positively affected by the reduction of olefins, but this effect is more than counterbalanced by the increase in the peroxides and the decrease in sulfur concentration (sulfur is a natural anti-oxidant). Poorer stability is observed as degradation of the fuel when stored more than a few weeks. Instability products (gums, varnishes) can plug fuel filters and/or impede proper fuel system component operation. Hydro processed low sulfur diesel fuel has also been demonstrated to possess poorer lubricity properties than earlier diesel fuels. This loss of lubricity has resulted in high rates of fuel system component wear in tests run by some fuel injection equipment (FIE) manufacturers.

PENRAY'S Recommendation:

Since the character of the fuel being used is unknown to the consumer, he cannot predict the effect on his system. Preventative action is far more effective than remedial action for these types of problems (stability, lubricity). Fuels at greatest risk, (such as those used for stand-by power generation or stored in backup vehicles which see infrequent, limited use) should be treated with stabilizer when delivered. It is the position of Penray that consumers should educate themselves and discuss this issue with their engine manufacturer. If, after such discussion the customer wishes to take preventative action to insure the normal operating life of their fuel injection pumps and/or fuel injectors we recommend the use of a well documented stability, lubricity and injector cleaning fuel additive such as Penray Fuel Prep™. Fuel Prep can also be used as a remedy to assist in the restoration of degraded fuel to more usable condition. Optimum results will be achieved by using a 150 ppm dose of Fuel Prep 2012 (a ratio of 17,000) or 700 ppm of Fuel Prep 1000 (a ratio of 1:350) and blending the fuel 50% with fresh diesel. If blending is not convenient, the treated fuel may be used straight.

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