

Exceeding Expectations

DIESEL FUEL LUBRICITY

In 2006 the Diesel Fuel sulfur specification was lowered from 500 ppm maximum in Low Sulfur Diesel (LSD) to 15 ppm maximum and was now called Ultra-Low Sulfur Diesel (ULSD).

The deeper desulfurization required to meet the lower sulfur specification resulted in the loss of natural fuel lubricity. The lubricating properties of diesel fuels are important for rotary and distributor type fuel injection pumps to help prevent wear. In these pumps, moving parts are lubricated by the diesel fuel and not engine oil.

The ASTM D975 lubricity specification that went into effect on January 1, 2005 was prompted by concerns over the loss of lubricity with the new ultra-low sulfur diesel fuel. Simply put, lubricity is determined by rubbing a metal ball on a flat disc submerged in the fuel being tested to determine scarring and wear.

The test methods to determine lubricity are ASTM D6079 and ASTM D7688 Lubricity by HFRR (High Frequency Reciprocating Rig) and the specification is 520 maximum micron (0.520 mm) wear scar. European lubricity specifications are even more stringent at 460 maximum micron (0.460 mm) wear scar.

ULSD at the refinery has a typical wear scar of 600+ microns. To meet the downstream ASTM D975 HFRR lubricity specification customers can add a lubricity improver additive.

HFRR Unit at AmSpec Avenel NJ



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AmSpec can test your fuel in one of our state of the art laboratories to determine its current lubricity. AmSpec Additives can additize your fuel as needed to meet any desired lubricity specification.

Contact your local AmSpec representative to set up HFRR lubricity testing and inquire about additive options. Visit us at www.amspecgroup.com for global locations and additive services.

The following is the ASTM method described in detail:



ASTM D6079 Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)

1. Scope

1.1 This test method covers the evaluation of the lubricity of diesel fuels using a high-frequency reciprocating rig (HFRR).

4. Summary of Test Method

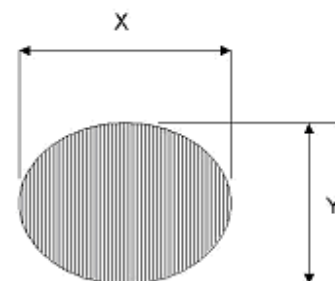
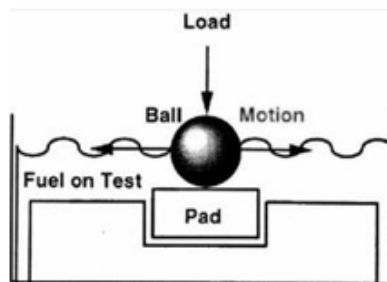
4.1 A 2-mL test specimen of fuel is placed in the test reservoir of an HFRR and adjusted to either of the standard temperatures (25 or 60°C).

4.2 When the fuel temperature has stabilized, a vibrator arm holding a non-rotating steel ball and loaded with a 200-g mass is lowered until it contacts a test disk completely submerged in the fuel. The ball is caused to rub against the disk with a 1-mm stroke at a frequency of 50 Hz for 75 min.

4.3 The ball is removed from the vibrator arm and cleaned. The dimensions of the major and minor axes of the wear scar are measured under 100x magnification and recorded.

5. Significance and Use

5.1 Diesel fuel injection equipment has some reliance on lubricating properties of the diesel fuel. Shortened life of engine components, such as diesel fuel injection pumps and injectors, has sometimes been ascribed to lack of lubricity in a diesel fuel.



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WEAR SCAR MEASUREMENT - TK ████ **8.12.14**

PCS Instruments - HFRRPC v2.11

Measurement 1 of 1 taken by db on Tuesday, August 12, 2014 11:20 AM
Wear Scar X: 460 um Wear Scar Y: 357 um Wear Scar Avg: 408.5 um

WEAR SCAR MEASUREMENT - ROUND ROBIN

PCS Instruments - HFRRPC v2.11

Measurement 1 of 1 taken by JK on Monday, June 30, 2014 3:02 PM
Wear Scar X: 543 um Wear Scar Y: 620 um Wear Scar Avg: 581.5 um

These are test run pictures taken at the AmSpec Paulsboro Lab using the D6079 HFRR microscope camera.



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