DETERMINATION OF LUBRICITY OF BIODIESEL AND DIESEL FUEL

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Lubricity is defined as the ability of a liquid to provide hydrodynamic and/or boundary lubrication to prevent wear between moving parts; or the ability to reduce friction between solid surfaces in relative motion. Thus, diesel fuel with poor lubricity will contribute to wear and tear in the fuel system of diesel engines.

Various international standard specifications for diesel fuel, such as the European Standard Specification for Diesel Fuel (EN590), Worldwide Fuel Charter and US Diesel Fuel Specification (ASTM D975) specify the wear scar diameter (WSD) from a high frequency reciprocating rig (HFRR) of 400 to 520 μm as the acceptable limits (*Table 1*).

The referee method for measuring lubricity is the High Frequency Reciprocating Rig (HFRR) test (ASTM D 6079), which measures the wear scar diameter on a specimen ball rubbed against a disk under specified conditions. As bigger scar indicates poorer lubricity, the standards specify the maximum diameter.

HIGH FREQUENCY RECIPROCATING RIG (HFRR) TEST

The fuel is evaluated using the HFRR test system. Briefly, a steel ball is held against a stationary disk with a load of 200 g and rubbed back and forth at a frequency of 50 Hz for 75 min. The diameter of the wear scar produced on the steel ball is measured.

TABLE 1. SPECIFICATION ON LUBRICITY IN INTERNATIONAL STANDARDS FOR FOSSIL DIESEL FUEL

Standard	Maximum wear scar diameter (μm)
European Standard Specification for Diesel Fuel (EN 590)	460
Worldwide Fuel Charter	400
Performance Requirement and Test Method for Assessing Fuel Lubricity (SAE J 2265)	450
Engine Manufacturers Association (EMA)	450
Diesel Fuel Specification (ASTM D 975)	520

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Figure 1. High frequency reciprocating rig (HFRR) test system.

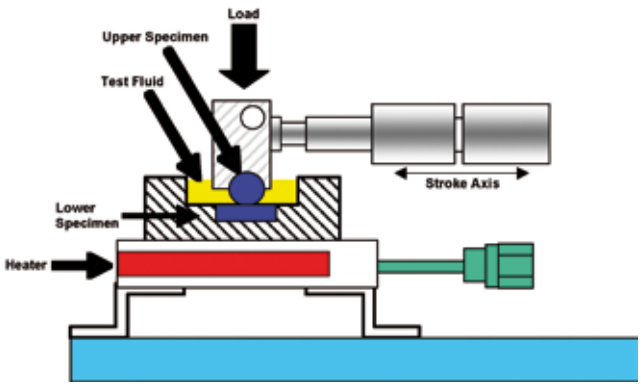

Figure 2. Standard test conditions for determination of lubricity by ASTM D6079

Temperature	:	60 ± 2°C
Stroke length	:	1 ± 0.02 mm
Fluid volume	:	2 ± 0.2 ml
Frequency	:	50 ± 1 Hz
Load	:	200 ±1 g
Time	:	75 ± 0.1 min

Cost of analysis: RM 1000 per sample

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