Evaluation of DME Fuel Lubricity 
by HFRR Test Method

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Abstract

DME as a fuel for compression ignition (diesel) engines has been actively studied for about ten years due to its characteristically low pollution and reputation as a “smokeless fuel”. During this time, the practical application is taking shape based on necessary tasks such as analysis of injection and combustion, engine performance, and development of experimental vehicles. At this moment, standardization of DME as a fuel was started in ISO from 2007. For the purpose of standardizing DME fuel quality for vehicles, it is necessary to evaluate its effects on: (1) the tolerance of materials, (2) the engine performances, and (3) the durability of engine system. The evaluation of the fuel lubricities that greatly affect the durability of the fuel injection system is required to be discussed as soon as possible.

Effects of impurities of fuel, which are worried to mix during producing and delivering when DME fuel for vehicles is put on a market, on DME fuel lubricities were investigated by special modified HFRR (High-Frequency Reciprocating Rig).

Adding 100 ppm of fatty acid type lubricity improver in DME could be reduced the wear scar diameter 400 μm below. Fatty acid, the main component of the lubricity improver used in this test, is presumed to secure lubricity by being absorbed in metallic sliding parts and forming metallic soap. Water contamination of around 300-500 ppm and above increased wear scar diameter clearly. Methanol contamination did not affect on DME fuel lubricity.