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Standard Test Method for Evaluating Lubricity of Diesel Fuels using the UMT in a Fast Reciprocating configuration. ASTM D 6079-02

Summary of Test Method:

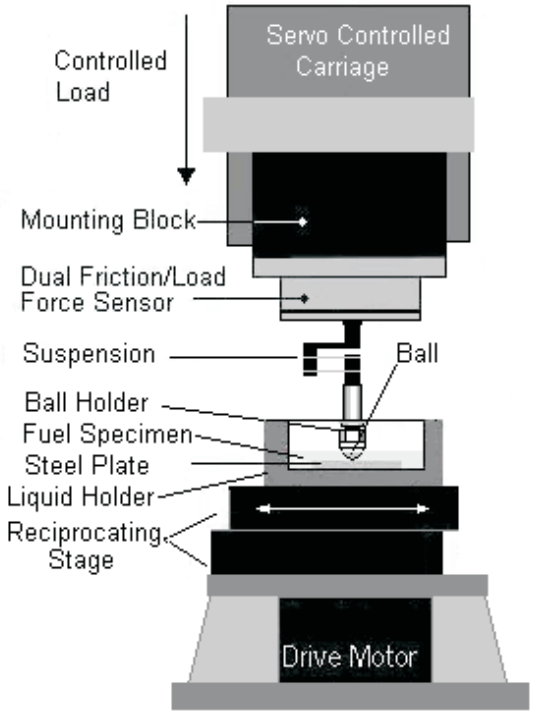
This test method evaluates the lubricity of middle distillate diesel fuels using a fast reciprocating lower drive on the Micro-tribometer model UMT. The lubricity of a fuel is evaluated by the dimensions of the wear scar on a ball upper specimen at the end of a 75 minute wear test. During the test a steel plate (lower specimen) is held in a liquid holder on the specimen table of the reciprocating lower drive. The plate is submerged in a bath of the diesel fuel test specimen. A chrome steel test ball (upper specimen) of diameter 6 mm is held stationary in a ball holder. The ball holder is mounted to a sensor that measures both lateral force (friction) and vertical force (load). The sensor is attached to a motorized carriage which applies a load of 200 g. using the sensor output to control the applied load. The steel plate is vibrated at 50 Hz in a reciprocating horizontal motion for a period of 75 minutes. At the end of the test the ball is removed form the holder. Its wear scar is measured along its major axis and minor axis, and the data is recorded.

The UMT allows for monitoring during the test the actual dynamic normal load, friction force, friction coefficient, and depth of wear. Optionally, it can measure additional parameters of contact acoustic emission, temperature, electrical resistance, and humidity.

Test Parameters						
Liquid Specimen	**Temperature**	**Humidity**	**Load**	**Reciprocating**	**Stroke**	**Duration**
2 ±0.2 mL	25 ±2° C	> 30 %RH	200 g.	50 Hz	1 ±0.02 mm	75 Min.

UMT Hardware Configuration:

- 2” Mounting Block - PN M30C366-1
- Model DFM-0.5 Dual Friction/Load Sensor range 5 to 500 g
- Suspension for 500 g Sensor - PN AM30B825E-2
- Upper Specimen 6.3 mm Ball Holder for sensors mod. DFM PN AM30B470B
- Upper Specimen 6.3 mm Stainless Steel Ball PN BM110002
- Lower Reciprocating Drive - mod. R23M0
- Liquid Specimen Holder - PN AM30C167C
- Lower Specimen Stainless Steel Test Plate - PNAM30B430A
- Optional Additional Sensors
  - mod. AE-5 Contact Acoustic Emission Detector
  - mod. HT-100 Humidity and Temperature Measurement & Recording
  - mod ECR-1 Electrical Contact Resistance Measurement and Recording



UMT Software Test Setup:

UMT Options File:
Load the options file which contains settings for the reciprocating drive and the 500 g force/load sensor.

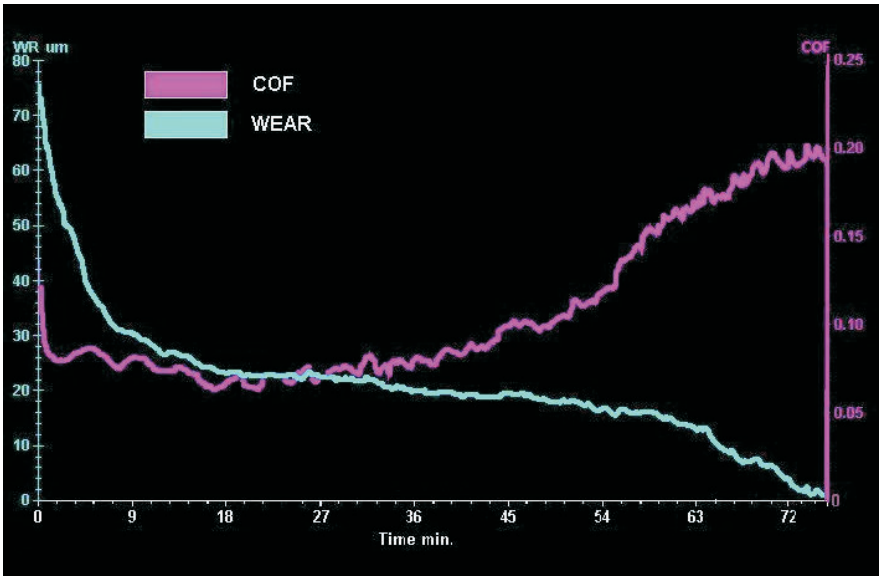
Test Sequence:
The Test Sequence should consist of 2 steps.

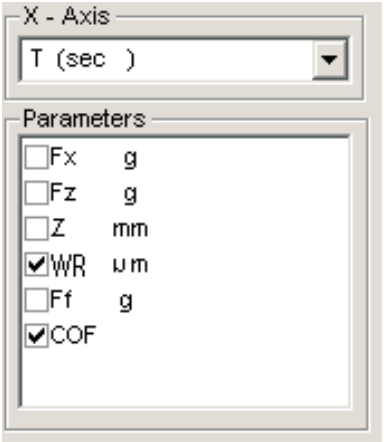
Step 1 is for settling time for the carriage to establish the initial normal load.
Carriage - applies a 200 g Constant Force for a Duration of 10 sec.
Spindle – Velocity is 0 revs/min.
Slider – is idle.
Step 2 is a 75 min. wear test period
Carriage - applies a 200 g Constant Force for a Duration of 75 min.
Spindle – Velocity is 3000 revs/min, Move-continuous
Slider – is idle.

Data Collection:
The following should be checked under DataFile:
Fx – Friction Force
Fz – Normal Force
COF – Coefficient of Friction
T – Time
Z1 – Carriage Position (Used to determine Wear Depth)
AE input – Acoustic Emission (optional)
Rh input - Relative Humidity
Te input - Temperature (optional)
R1 - Eletrical Contact Resistance (optional)

Report:

Use the Viewer program to plot test results.
Select the parameters to be displayed by checking the appropriate box under Parameters on the Viewer screen.
Multiple test results can be viewed at the same time as in the example below.





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