

**Standard Test Method for Determining Extreme Pressure Properties
of Lubricating Greases using the UMT-3 in a High Frequency, Linear
Reciprocating configuration.
ASTM D 5706-97 (Reapproved 2002)**

Summary of Test Method:

This test method evaluates the extreme pressure properties of lubricating greases using a fast reciprocating lower drive on the Macro-tribometer model UMT-3. During the test a steel plate is held on the specimen table of the reciprocating lower drive. A small amount of the lubricating grease test specimen is placed on the steel plate. A chrome steel ball of diameter 10 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 loads the ball against the steel plate in the center of the grease specimen. The sensor vertical force output is used to control the applied load.

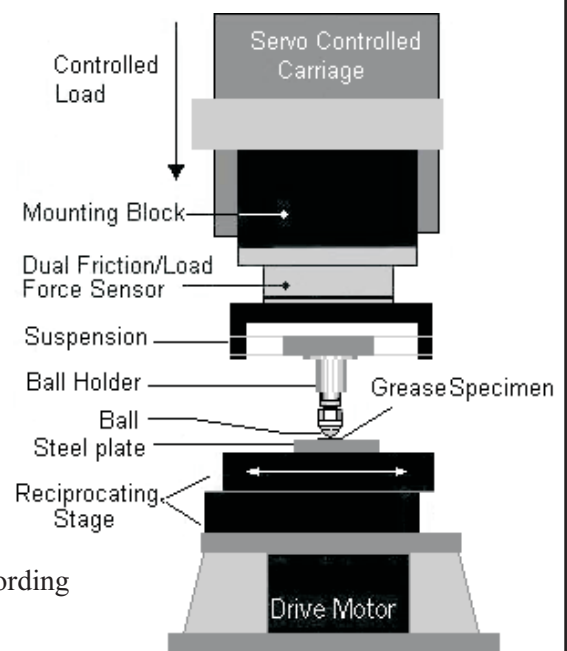
During a 30 second break-in period the steel plate is vibrated at 50 Hz in a reciprocating horizontal motion with the ball loaded at 50 N. After the break-in period the load is increased to 100 N for a duration of 2 minutes. The load is increased in increments of 100 N for successive periods of 2 minutes until the coefficient of friction exceeds .2, seizure occurs, or the load limit of 1000N is reached. The highest test load before seizure 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				
Grease Specimen	Load	Frequency	Stroke Length	Duration
.1 to .2 grams	Break-in: 50 N Test: 100 N Incremnts	50 Hz	1 mm	Break-in: 30 sec. Test: 2 min. Increments

UMT Hardware Configuration:

- 2” Mounting Block - PN M30C366-1
- Model DFH-100 Dual Friction/Load Sensor range 1 to 100 kg
- Suspension for 100 kg Sensor - PN AM30C417C-7
- Upper Specimen 10 mm Ball Holder for sensors mod. DFH
PN AM30B1047
- Upper Specimen 10 mm Stainless Steel Ball - package of 100
PN BM110006
- Lower Reciprocating Drive - mod. R23M0
- 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 & Recording



UMT Software Test Setup:

UMT Options File:

Load the options file which contains settings for the reciprocating drive and the 1000 N force/load sensor.

Test Sequence:

The test script consist of 2 sequences. The first sequence is a single step for break-in with a 50 N load. The second sequence has 10 steps. The load starts at 100 N in the first step and is incremented by 100 N with each successive step. A conditional stop is set to terminate the sequence when a friction coefficient (COF) of 0.2 is exceeded.

Sequence - Break-in

Step 1

General - Constant Force, 30 sec.

Carriage - Force -50 N

Reciprocating – 3000 revs/min., Continuous

Slider – idle.

Sequence - Test

Condition for ending test: $F1 > 0.2$ ($F1$ is COF)

Step 1

General - Constant Force, 2 min., Conditional Stop

Carriage - Force -100 N

Reciprocating – 3000 revs/min, Continuous

Slider – idle.

Steps 2-10

General - Constant Force, 2 min., Conditional Stop

Carriage - Start at current level, Offset -100 N

Reciprocating – 3000 revs/min, Continuous

Slider – idle.

Data Collection:

The following should be checked under DataFile:

Fx – Friction Force

Fz – Normal Force

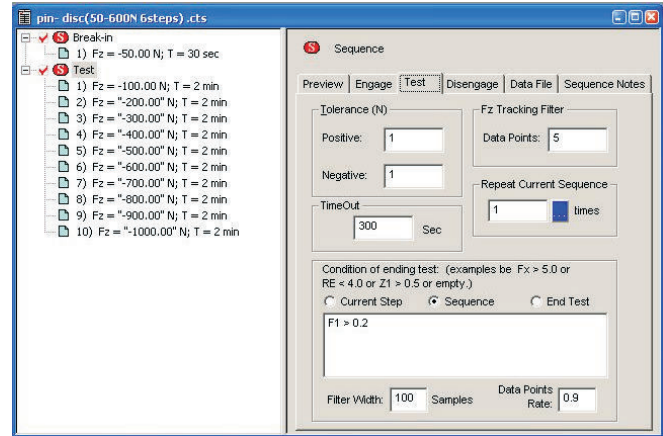
COF – Coefficient of Friction

T – Time

AE input – Acoustic Emission (optional)

Te input – Temperature (optional)

R1 - Electrical 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.

Select the last test step that was recorded. Note the value of Fz (load) before COF exceeded 0.2.

