

Test Method for Measuring the Durometer of Soft Materials Using the UMT

ASTM D 2240-00

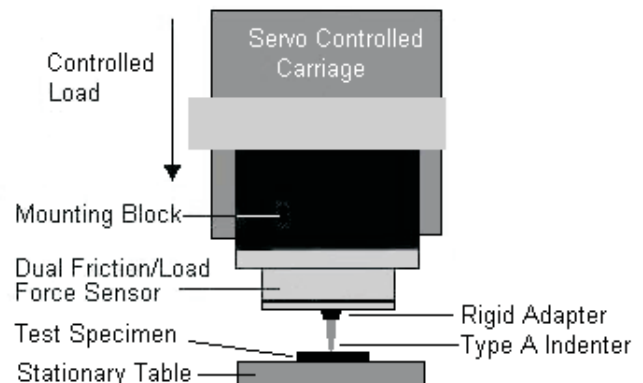
Summary of Test Method:

This test method uses a Shore Hardness Type A indenter which is mounted to a force sensor on a motor driven vertical positioning carriage. The carriage presses the indenter downward against the test material with a force of 822 grams using the force sensor for feedback to control the load. The position encoder on the carriage has a resolution of 0.5 μm and is used to record the depth of penetration. Durometer is a dimensionless quantity. The value of durometer of a material depends on the depth of penetration. Penetration of 2.5 mm or more is a durometer of 0. Penetration of 0 mm is a durometer of 100. For example, a penetration of 1 mm would be a durometer of 60. The rate of penetration can be programmed from 0.002 to 10 mm/s. Force and displacement are recorded vs time allowing for additional measurements such as creep.

Optionally, the UMT can measure and record temperature and humidity.

UMT Hardware Configuration:

- 4" Mounting Block N M30C366-2
- Model DFM-1 Dual Friction/Load Sensor range 0.01 to 1 kg
- Rigid Adapter for type DFM sensors
- Shore Type A Indentor
- Stationary Specimen Table or any Lower Drive
- Optional Additional Sensors
mod. HT-100 Humidity and Temperature Measurement & Recording



UMT Software Test Setup:

UMT Options File:

Load the options file which contains settings for the 1kg force/load sensor.

Test Sequence:

The Test Sequence should consist of 2 steps.

Step 1 is for settling time for the indenter to establish the initial contact with specimen.

- General** - *Controlled Carriage/Load, Constant Force(Fz), Duration 5 sec.*
- Carriage** - *Force 5 g, Check box "Reset Position at the beginning of this step"*
- Spindle** - *Velocity is 0 revs/min.*
- Slider** - *idle.*

Step 2 is a 15-sec. Measurement period

- General** - *Controlled Carriage/Load, Constant Force(Fz), Duration 15 sec.*
- Carriage** - *Force 822 g*
- Spindle** - *Velocity is 0 revs/min, Move-continuous*
- Slider** - *idle.*

Data Collection:

The following should be checked under DataFile:

- Fz – Normal Force
- T – Time
- Z1 – Carriage Position (Used to determine Depth)
- Rh input - Relative Humidity (optional)
- Te input – Temperature (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. Durometer is $100 \times (1 - Z/2.5)$ where Z is the final value of the Z axis displacement.

