

## VISCOMETER OR RHEOMETER?

## VISCOMETER AND RHEOMETER COMPARISON

Viscometers and rheometers are used throughout the polymer industry to determine material properties before, during and after the vulcanisation process. The most commonly used versions in the rubber industry are a Mooney Viscometer and Rotational (Moving Die) Rheometer. Both apply a shearing force to a polymer sample within a sealed cavity. The reactionary torque of the sample is measured by a transducer and used to determine material properties. Test time, frequency, amplitude and temperature can all be varied to investigate more advanced material characteristics.

The main difference lies in how the shearing force is applied and how the resultant torque is interpreted.

A Mooney Viscometer uses a rotor embedded within a sample to exert a shearing force by full rotation. Testing is typically at sub-cure temperatures. The resultant torque measurement is used to determine viscosity using an arbitrary scale, Mooney Units (MU). Conversely, a Rotational (Moving Die) Rheometer does not use a rotor, but instead utilises an oscillating die to exert a shearing force on a sample. Temperatures are typically higher, as to induce vulcanisation. The torque signal (dNm) is used to express both cure and rheological/ viscoelastic properties.



	Mooney Viscometer	Rotational Rheometer
Model	Mooney Viscometer Mini Mooney Viscometer *Mooney Viscometer Variable Speed	Moving Die Rheometer Mini Moving Die Rheometer **Multi-Function Rheometer
Primary Measurement	Mooney Viscosity	Cure Properties Rheological Properties Viscoelastic Properties
Vulcanisation	Uncured Polymer	Cured Polymer
Automation	Not Available	Available
Die Assembly	Sealed Cavity; Large or Small Rotor	Sealed Bi-Conical Cavity; Rotor-Less
Movement	Full Rotation	Oscillation
Frequency	2 RPM (Std.) *Up to 20 RPM	1.67 Hz **Up to 50Hz
Amplitude	n/a	0.5° (Std), 1.0°, 3.0° **Up to 360°
Torque Action	Rotor	Moving Die
Torque Measurement	Mooney Units (MU)	Torque (dNm)
Typical Test Temperature	100°C	180°C
Typical Sample Volume	14.3 cm <sup>3</sup>	4.5 cm <sup>3</sup>
Standard	ISO No. 289 / ASTM D1646	ISO No. 6502 / ASTM D5289