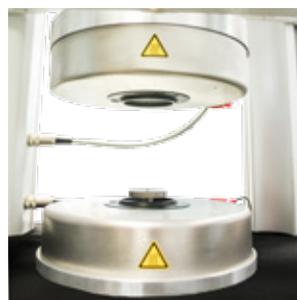
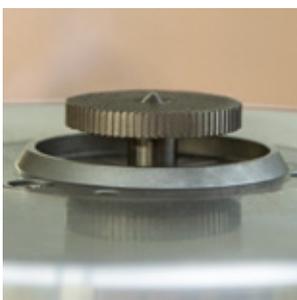
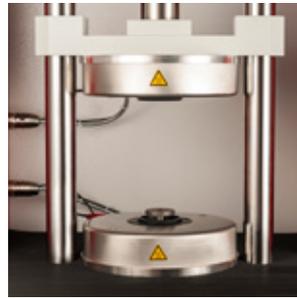


## Mooney Viscometer



...Innovative testing solutions  
made in Germany!



# MonTech Mooney Viscometer Series

Mooney Viscometers are the backbone for testing the viscous flow of raw materials such as polymers and intermediates such as masterbatches for maintaining stable and consistent manufacturing processes. Furthermore, all MonTech Mooney Viscometers also allow Scorch as well as Stress Relaxation testing.



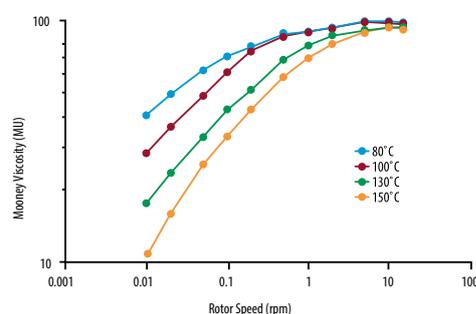
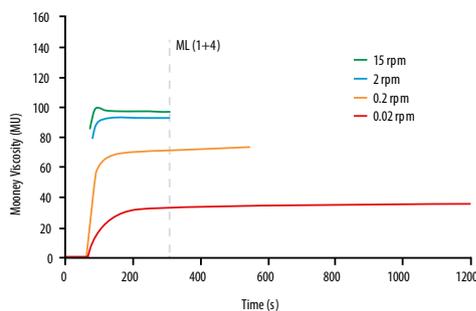
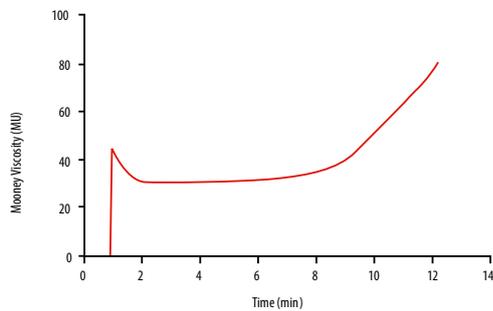
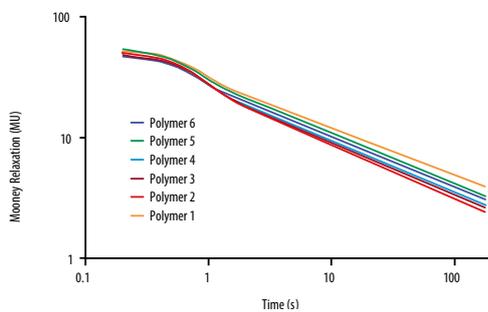
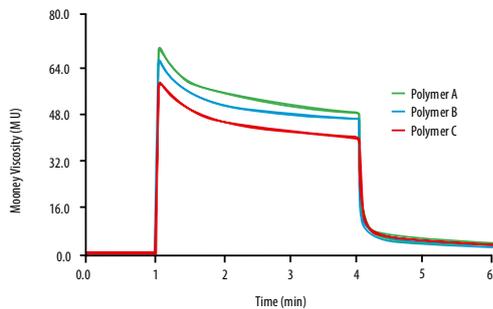
## STATIC TESTING

## DYNAMIC TESTING

	MV 3000 Basic	MV 3000	V-MV 3000
<b>Instrument description</b>	Entry model instrument for repetitive Quality control testing as well as simple R&D applications	Standard instrument for QC and R&D testing according to international standards.	High-end instrument for QC as well as dynamic R&D testing with maximum flexibility featuring variable rotor speed and temperature sweeps as well as block programming with multi-step stress relaxation.
<b>International standards</b>	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
<b>Test modes</b>	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney, Mooney Variable Viscosity, Variable test sequence block programming Multi-step stress relaxation
<b>Rotor</b>	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals
<b>Rotor speed</b>	2 turns per minute	2 turns per minute	0 to 50 turns per minute, 0.01 steps
<b>Stress Relaxation</b>	According to ISO 289:2005, DIN 53523 Part 4	According to ISO 289:2005, DIN 53523 Part 4	According to ISO 289:2005, DIN 53523 Part 4
<b>Temperature control system</b>	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
<b>Units</b>	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)

# MonTech Mooney Viscometer Application Examples

Contact us today for a demonstration using your compounds and materials!



## Mooney Viscosity

The Mooney Viscosity test is the most popular test method for characterizing polymers and uncured rubber materials. As defined by international standards, the sample material is preheated for a defined period in a closed die cavity, then sheared by the embedded rotor at a constant rate. The Mooney Viscosity is recorded and data is automatically calculated at predefined time and viscosity points. MonTech Mooney Viscometers offer superior precision and repeatability, providing the user with reliable data and making it easy to differentiate between different types and grades of polymers in order to ensure a high processing consistency.

## Mooney Stress Relaxation

As Mooney Viscosity testing only provides information about the flow = viscosity of polymers and rubber compounds, stress relaxation testing can be used to assess elastic material behavior. This does not even require additional samples or testing efforts. Once the Mooney Viscosity test is completed, the rotor is stopped within 5 milliseconds and the torque decay is observed and recorded. Once the stress relaxation is completed, the slope-intercept and regression coefficient are calculated, providing excellent correlations in reference to polymer branching and processing.

## Mooney Scorch

Mooney Scorch is one of the most useful tests to determine starting of cure - so called scorching behavior - of rubber compounds, providing essential data for designing and controlling production processes as well as checking material consistency. Of course, every MonTech Mooney Viscometer offers full Mooney Scorch and Delta Mooney testing capabilities featuring a selection of over 3500 datapoints which include initial Mooney viscosity, minimum viscosity, scorch times and scorch viscosities.

## Mooney Viscosity at Shear Rates and Temperatures

Besides only static testing, MonTech Variable Mooney Viscometers such as the V-MV 3000 offer full dynamic testing capabilities, allowing measurement of viscosity at variable shear rates (by stepless changes of the rotor speed) and temperatures. Furthermore, even non-isothermal sequences, variable rotor speed profiles as well as step-relaxations can easily be programmed and executed. Overall, this allows a detailed and complete understanding of the polymer behavior. Along with this, low rotor speed rates in Mooney Viscosity testing even provide the ability to test highly elastic and shear sensitive materials that could not be properly tested and characterized on Mooney Viscometers before.

# MonTech MV 3000 Basic

## Entry level Mooney Viscometer

### The MV 3000 Basic

is a rotational shear viscometer according to Mooney for performing

- Viscosity tests (ML / MS 1+X)
- Stress Relaxation testing
- Mooney Scorch
- Delta Mooney testing

on polymers as well as rubber compounds for quality control, research and development applications.

The MV 3000 Basic is supplied as a complete, ready-to-test instrument set including a personal computer, MonControl Software, cables, connectors and regulators as well as a standard set of tools and consumables.

**Easy to use:** All test parameters are pre-programmed through the MonControl Software - the instrument is equipped with a single button for starting the test sequence.

**Direct feedback:** An integrated multi-color LED status bar clearly displays the current machine state.

**Rugged:** The compact and highly rigid frame is made from high strength aluminum. Along with direct-drive technology, this guarantees stable and accurate test results in every environment.



### Rotor, die assembly and drive system

The most fundamental and important parts on a Mooney Viscometer are the rotor, die assembly and in-line drive shaft. The test sample is placed below and above the rotor with optional test film. Then the upper die is lowered onto the lower die with a force of 11.5 kN.

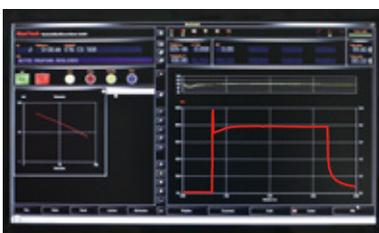
After a pre-heat time, the rotor - which is now totally embedded in the test material in the closed die cavity - rotates at a fixed speed of 2 turns per minute, powered by an in-line drive system.

During the whole test sequence, the temperatures of both dies are measured by a separate precision probe on each die and the heaters are accordingly controlled and regulated to precisely maintain the temperature at its setpoint.

The torque needed to turn the rotor in the test material is precisely measured by an in-line torque transducer. Torque in Mooney Units (MU), die temperatures and rotor speed are recorded. Data is automatically calculated and displayed once the test is completed.



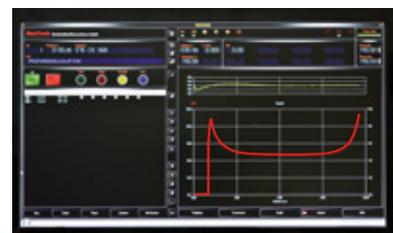
### MonControl Software for test configuration, data acquisition, result calculation and reporting



Mooney Viscosity test with stress relaxation and log-log graph



Test results with automatic Pass / Fail calculation

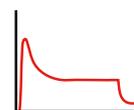


Mooney Scorch test

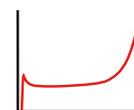
## Technical specification

<b>International standards</b>	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
<b>Die configuration Rotor</b>	According to international standards large (ø 38.1 mm) and small (ø 30.48 mm) Rotor
<b>Force measurement</b>	In-line torque transducer
<b>Closing force</b>	11.5 kN
<b>Rotor speed</b>	2.00 turns per minute (0.21 Radians / second)
<b>Rotor shaft seal</b>	Standard or longlife seals available
<b>Stress Relaxation</b>	According to ISO 289:2005, DIN 53523 Part 4
<b>Torque range</b>	0.01 to 230 MU
<b>Sample volume</b>	Two specimens having a combined volume of 25 cm <sup>3</sup>
<b>Temperature control system</b>	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
<b>Temperature check system</b>	Recordings of the temperature gradient on the screen, PID microprocessor monitored
<b>Calibration</b>	Fully automatic by built in calibration weights, Software guided
<b>Measured data</b>	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
<b>Data Interface</b>	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
<b>Data points</b>	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regressions coefficient, Scorch viscosities and cure times
<b>Pneumatics</b>	min. 4.5 Bar / 60 psi
<b>Electrical</b>	Single phase 100 - 120 V, 8 Amps or 200 V - 240 V, 5 Amps
<b>Instrument options</b>	- Instrument control panel with 5" touchscreen display and printer - Double channel forced air cooling system - Low-temperature cooling system M-Cool 10 - M-VS 3000 constant volume sample cutter

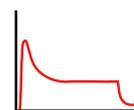
## Calculated results



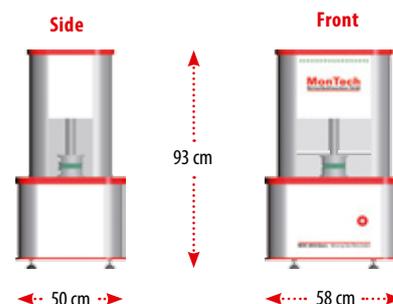
Mooney Viscosity



Mooney Scorch



Stress Relaxation



## **MonTech MV 3000**

### **Industry standard Mooney Viscometer**



#### **The Mooney Viscometer MV 3000**

is the leading test instrument for measurement of viscosity, scorching and stress relaxation on polymers and rubber compounds.

The MV 3000 is suitable for quality control as well as research and development purposes with excellent repeatability and reproducibility due to its low-mass die design, direct heating and a unique direct drive design with snap-in mechanics.

The massive aluminum frame of the MV 3000 with its 270° accessible die area allows easy sample loading while integrated rotor ejection simplifies rotor handling. Operation is made easy by 4 illuminated pushbuttons providing clear information about the machine state. A motorized safety shield separates the die area before the test sequence is started.

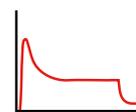
Die temperatures are accurately and precisely measured by calibrated probes and controlled with a precision of  $\pm 0.03$  °C by heaters, dies and rotors with an extremely fast thermal response

The MV 3000 is fitted with built-in software-controlled systems for automatic balancing and calibration, including a double dead-weight system to apply a defined torque of 100 Mooney units, ensuring the utmost data accuracy and eliminating the needs of any external tools or fixtures.

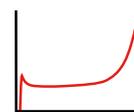
## Technical specification

<b>International standards</b>	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
<b>Die configuration / Rotor</b>	According to international standards large (ø 38.1 mm) and small (ø 30.48 mm) Rotor
<b>Force measurement</b>	In-line torque transducer
<b>Closing force</b>	11.5 kN
<b>Rotor speed</b>	2.00 turns per minute (0.21 Radians / second)
<b>Rotor shaft seal</b>	Standard or longlife seals available
<b>Stress Relaxation</b>	According to ISO 289:2005, DIN 53523 Part 4
<b>Torque range</b>	0.01 to 230 MU
<b>Sample volume</b>	Two specimens having a combined volume of 25 cm <sup>3</sup>
<b>Temperature control system</b>	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
<b>Temperature check system</b>	Recordings of the temperature gradient on the screen, PID microprocessor monitored
<b>Calibration</b>	Fully automatic by built in calibration weights, Software guided
<b>Measured data</b>	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
<b>Data Interface</b>	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
<b>Data points</b>	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regression coefficient, Scorch viscosities and cure times
<b>Pneumatics</b>	min. 4.5 Bar / 60 psi
<b>Electrical</b>	200 V - 240 V, 6 Amps, 50/60 Hz
<b>Instrument options</b>	- Instrument control panel with 5" touchscreen display and printer - Easy access and encapsulated electronic system - Double channel forced air cooling system - Low-temperature cooling system MCool 10 - M-VS 3000 constant volume sample cutter

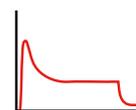
## Calculated results



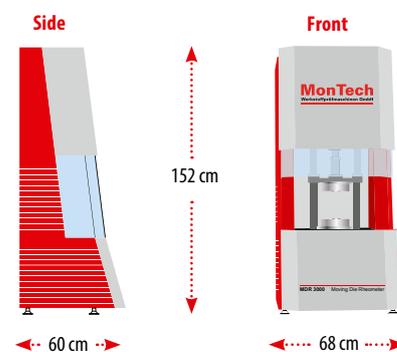
Mooney Viscosity



Mooney Scorch



Stress Relaxation



# MonTech V-MV 3000

## High-end Mooney Viscometer

### The Variable Mooney Viscometer V-MV 3000

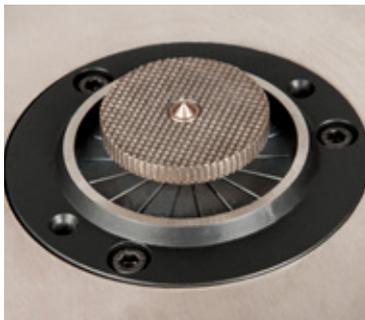
brings traditional Mooney Viscosity, Scorch and Stress Relaxation testing to the next level. Besides the ultra-rigid test frame, the instrument incorporates the latest direct servo drive technology and superior design for unbeaten data accuracy and test result precision.

In addition to static Mooney Viscometer testing at fixed rotor speeds under isothermal conditions according to international standards, the Variable speed Mooney Viscometer V-MV 3000 is further capable of running test sequences at variable rotor speeds as well as fully dynamic tests including speed steps, ramps and multi-step relaxation, all this with simultaneous temperature profiles and optional cooling of the sample in the die cavity to as low as  $+10^{\circ}\text{C}$ , making the V-MV 3000 not only ideal for polymers and rubber compounds, but also silicone, latex and epoxy resin testing.

This functionality efficiently provides very useful additional information on the test material at the highest accuracy. For example, materials showing similar static viscosities at 2rpm can now be tested at variable shear rates and temperatures.

From these results, polymer specialists can gain a much better understanding of polymer and rubber behavior regarding branching, molecular weight distribution, average molecular weight as well as shear thinning.

The instrument is equipped with MonControl Software and special block programming features to allow an unlimited number of rotor speeds and test temperatures per test - of course in any combination.



Lower radial v-groove die with large, serrated rotor. The low-mass rotor design ensures homogenous temperature distribution, and in conjunction with MonTech longlife seals, offers the highest accuracy in Mooney readings.



Rubber sample after Mooney scorch testing. Mooney Scorch testing is made simple with the V-MV 3000. Test can be automatically stopped once the maximum desired Scorch time or Scorch viscosity reading is reached, maximizing instrument availability and sample throughput.

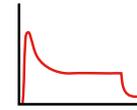


SBR Polymer sample after Mooney viscosity testing. Various types of testing film are available for easy sample handling, reduced cleaning needs, less die contamination and therefore improved repeatability.

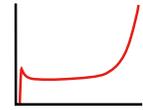
## Technical specification

<b>International standards</b>	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
<b>Die configuration / Rotor</b>	According to international standards large ( $\varnothing$ 38.1 mm) and small ( $\varnothing$ 30.48 mm) Rotor
<b>Force measurement</b>	In-line torque transducer
<b>Closing force</b>	11.5 kN
<b>Rotor speed</b>	0 to 50 turns per minute, 0.01 steps (0 to 5.25 radians / second)
<b>Stress Relaxation</b>	According to ISO 289:2005, DIN 53523 Part 4
<b>Torque range</b>	0.01 to 230 MU
<b>Sample volume</b>	Two specimens having a combined volume of 25 cm <sup>3</sup>
<b>Temperature control system</b>	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
<b>Temperature check system</b>	Recordings of the temperature gradient on the screen, PID microprocessor monitored
<b>Calibration</b>	Fully automatic by built-in calibration weights, Software guided
<b>Measured data</b>	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
<b>Data Interface</b>	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
<b>Data points</b>	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regression coefficient, Scorch viscosities and cure times
<b>Pneumatics</b>	min. 4.5 Bar / 60 psi
<b>Electrical</b>	200 V - 240 V, 6 Amps, 50/60 Hz
<b>Instrument options</b>	- Instrument control panel with 5" touchscreen display and printer - Easy access and encapsulated electronic system - Double channel forced air cooling system - Low-temperature cooling system MCool 10 - M-VS 3000 constant volume sample cutter

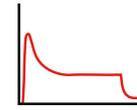
## Calculated results



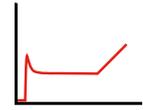
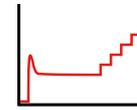
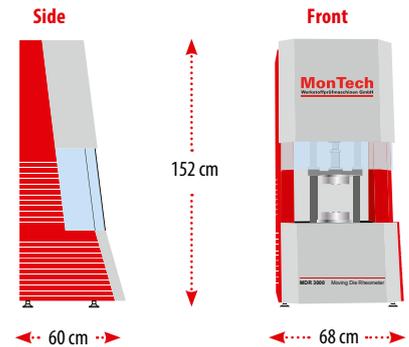
Mooney Viscosity



Mooney Scorch



Stress Relaxation

Rotor Speed  
Variation LinearRotor Speed  
Variation Steps

# MonTech Mooney Viscometer

## Cooling, data and productivity options

Expand measurement capabilities and increase instrument flexibility with MonTech's unique instrument options:

### Cooling options

#### Pneumatic cooling system

Both test dies are cooled separately by a PID-controlled forced air cooling system.

This system can be used to rapidly cool the Viscometer from a higher testing temperature (e.g. testing Mooney Scorch at 160°C) to a lower testing temperature (e.g. Mooney Viscosity testing at 100°C), significantly reducing operator waiting and non-productive times of the instrument.

On the V-MV 3000, this option can further be used for running Non-Isothermal testing sequences as well as actively cooling friction heat.



#### MCool 10

Integrated cartridge cooling system that allows cooling of the test dies and rotor below room temperature down to +10°C, adding additional test capabilities especially for low viscosity materials such as silicones, latex and epoxy resins.

This technology is worldwide patented by MonTech.



### Data / IT options

#### Integrated Industrial Computer

From harsh mixing plants to cleanrooms, special environments demand special encapsulation and protection of the computer system for controlling and managing the instrument.

MonTech therefore offers machine-integrated and machine-mounted computer systems in various protection ratings, guaranteeing the highest reliability under even toughest environmental conditions.

#### Instrument Control Panel

The 5" Color-Touchscreen allows the machine to be operated from a remote computer or completely standalone for simple quality control testing.

#### RS-232 Logic Interface

Compatibility to older host or software systems as well as interfacing with proprietary third party software systems are no problem for MonTech testing instruments.

Every machine can be equipped with a serial RS-232 bidirectional interface to program the instrument as well as retrieve test data and results by a simple, standardized ASCII protocol.

#### Result and Label Printer

All test results can be directly printed from the instrument through an optional printer.

Of course, reports for single test results, test series reports and even Pass/Fail labels, with or without barcodes, are available for printing.

## Productivity options

### Enhanced instrument protection

Explosive, corrosive or other critical environments are no problem for MonTech rubber testing machinery.

All instruments can be tailored to meet any international protection rating depending on what the customer environment requires.

### Instrument table or cart

For a flexible instrument setup and utilization, MonTech offers movable instrument carts, fixed workbench carts and movable closed-instrument carts.

Please contact us to discuss your individual instrument setup and space requirements to identify your ideal workplace scenario.

### Forced air aspiration system

For a safe workplace free from smells and fumes, even when testing aggressive or hazardous materials, a forced ventilation and aspiration system can be fitted to every MonTech Mooney Viscometer.



## Reference Standards and Materials

MonTech offers a full range of precise reference standards and materials for Mooney Viscometers.

### Calibration weights

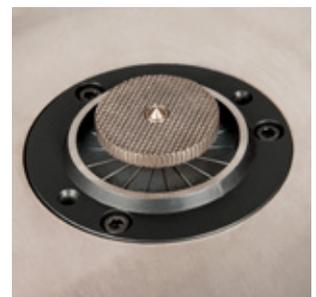
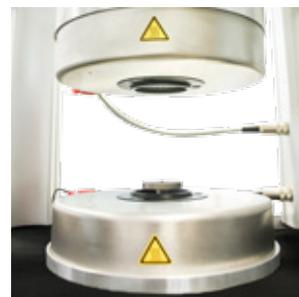
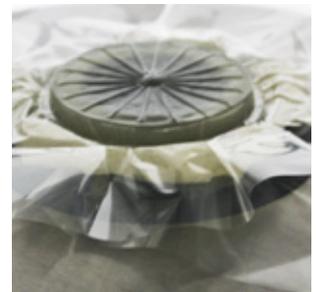
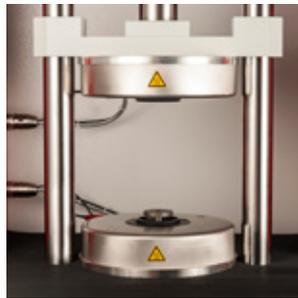
High precision calibration weight sets manufactured by MonTech are built into the instrument and controlled using a software guided calibration sequence, guaranteeing the highest accuracy and traceability for Mooney Viscometers.



### Reference polymers for Mooney Viscosity

Precut reference butyl rubber for Mooney viscosity as well as stress relaxation verification allows easy verification and consistency checks on Mooney viscometers. Each supply includes a test certificate and interlab validation. Compound stability is typically good for up to 10 months.

## Mooney Viscometer



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