



RPA Ultra – Advanced Rubber Process Analyzer Rheometer

Standards: [ASTM D5289](#), [ISO 6502](#)



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Description

The [RPA Ultra](#) is a closed cavity moving die rheometer that offers unconstrained oscillation strain and a frequency breakthrough of up to 100 Hz thanks to a rotating lower die. The advanced RPA device measures the dynamic and static characteristics of raw rubber compounds and elastomers throughout the curing process. Another technological advance is the increased shear rate range, which now spans 0.001 to 500 1/s. A high shear rate might be used to imitate the extrusion process in a genuine production setting. Learn more about rubber testing equipment here.

Due to the innovative engineering of the advanced rubber process analyzer, the sealed biconical dies and their capacity to significantly reduce slippage during a testing process. the RPA Ultra advanced rheometer can excel in measurement repeatability and reproducibility. As a terrific addition to the RPA Ultra, the new BareissOne software makes your testing process much simpler to manage and the findings much clearer. Click [here](#) if you want to check more Rubber Testing equipment from NextGen Material Testing.



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Advanced Rubber Process Analyzer Features

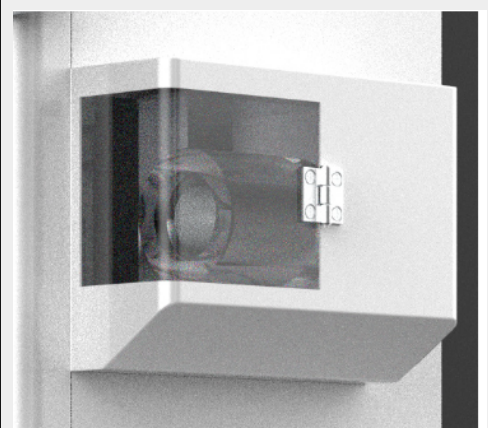
- High grade sheet material solid construction
- Film cartridge for test cavity continuous feeding
- No more strain cap with a rotatable lower die
- Easy mobility using retractable casters
- Rubber process analyzer is equipped with 12" touch display for easy user interface with a clear set of menus to provide navigation through all the available function
- A tray that can load multiple samples automatically



RPA Ultra Rotational Lower Die



RPA Automatic Sample Loading System



RPA Ultra Film Cartridge



Watch Video



Watch the RPA Ultra – Advanced Rubber Process Analyzer Rheometer product video.

[WATCH ON YOUTUBE](#)



RPA Ultra Additional Options

- Moving die rheometer. A fixed upper die and a fully rotating lower die offering unbounded oscillation strain
- Automatic sample loading mechanism available as an option to increase testing capacity of the RPA
- Film cartridge for quick and simple roll reloading

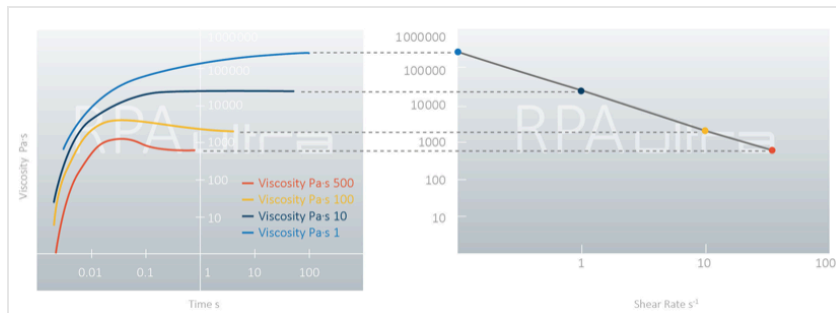
BareissOne is a modularized software that is aimed to provide a common platform with integration of different test categories.

Whether it is a standard test for one single measurement or a series of tests that requires a complex test sequence editing, BareissOne is designed to offer all levels of user's demands.

Features such as user authorization, system log, project management, version control and custom report are all at your fingertips.

BareissOne has made software use easier than it ever was before.

RPA Ultra Steady Share Viscosity

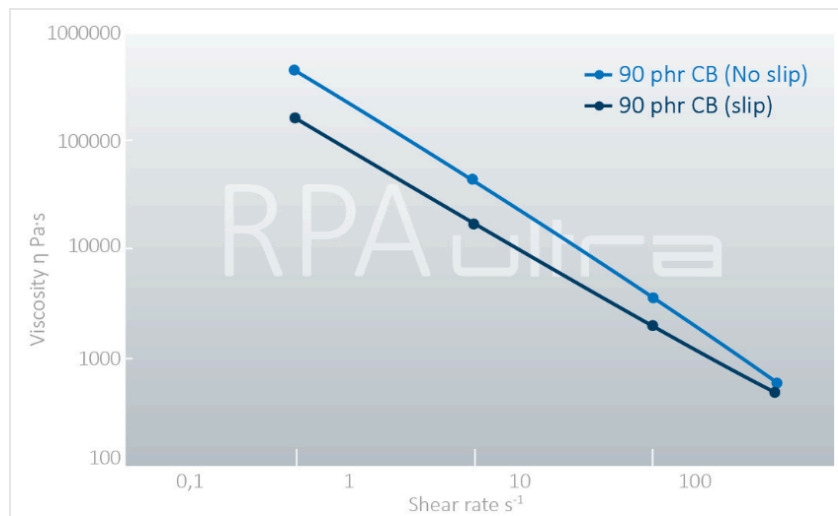


RPA Steady Share Viscosity Graph



One of the most crucial features for defining the process parameters for extrusion and injection molding is the constant shear viscosity. It is essential for understanding the manufacturing process of an unvulcanized rubber compound. The RPA Ultra offers the operator two test modes: dynamic and sustained shear, thanks to its rotating bottom die with limitless strain.

Wall Slip

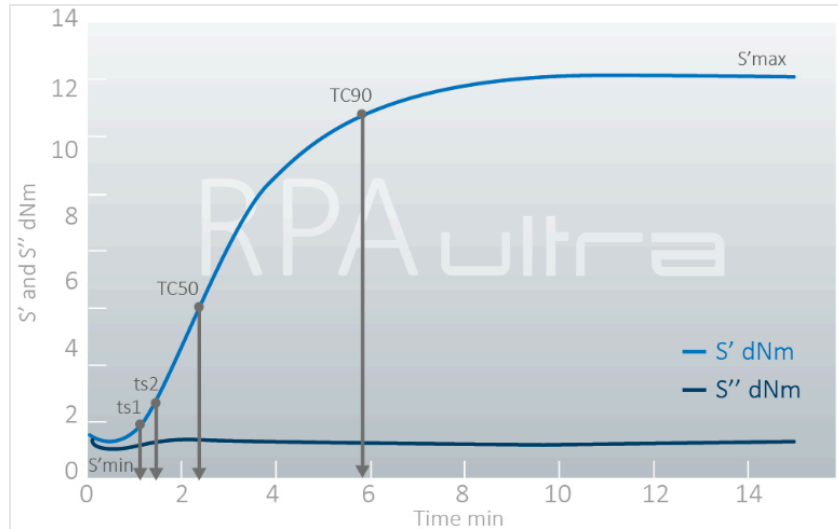


Rubber Process Analyzer Wall Slip Graph

The problem of Wall Slip is a severe obstacle in producing rubber compounds. Slippage can happen, for instance, between the extruder wall and the flowing material and is a rheological event. As an alternative, we provide a defined polished die set in place of the upper die. Thus, this enables the execution of Wall Slip tests in conjunction with internal controlled pressure.



Rubber Process Analyzer Isothermal Test

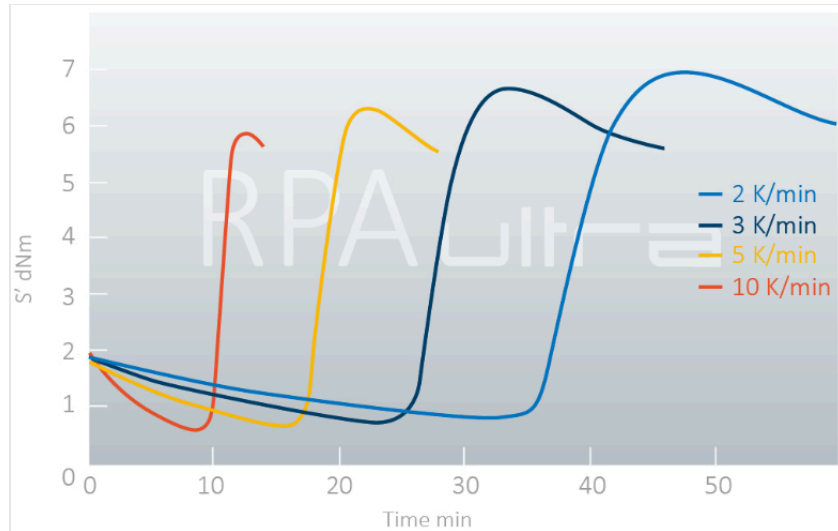


RPA Isothermal Test Graph

The isothermal cure tests on rubber compounds are among the most common and essential studies done. The BareissOne software determines all significant test parameters, including maximum and lowest torque, TC values, reaction time and rate, etc., and makes them available to the user in tabular or/and graphical form for additional analysis.



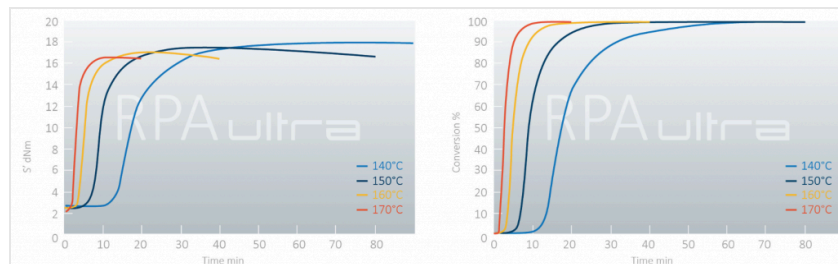
RPA Ultra Non-Isothermal Test



RPA Ultra Non-Isothermal Test Graph

Non-isothermal measurements (temperature sweep) are frequently performed at various heating rates to assess a sample's behaviour over a wide temperature range. The BareissOne program includes a module for kinetic calculations made possible by this measurement at various heating rates.

Moving Die Rheometer Kinetics



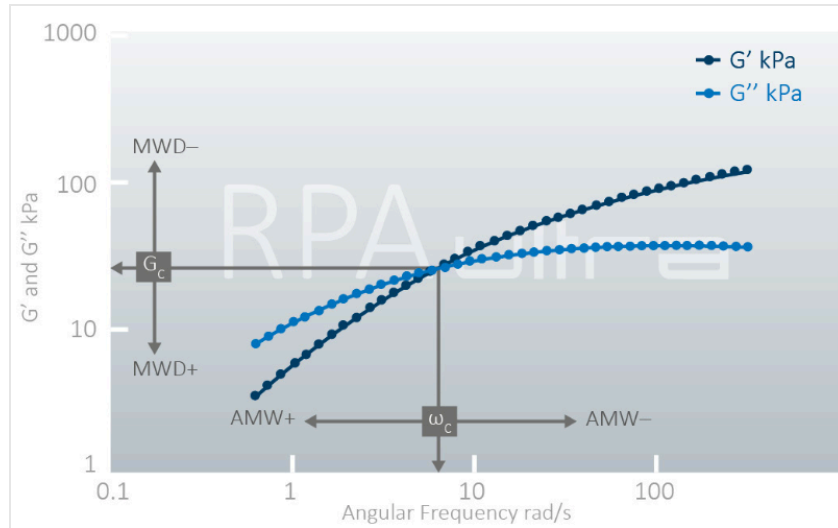
RPA Moving Die Rheometer Kinetics Graph

An isothermal test provides data for each temperature, including incubation duration, reaction sequence, and conversion rate constant. The computation complies with the DIN 53529 specification. Next, the activation energies of the incubation and the conversion can also be determined using the incubation period and the conversion rate constant at least



three different temperatures. These are crucial variables for calculating the test specimen's heating time and are also used in the production process.

Frequency Sweep

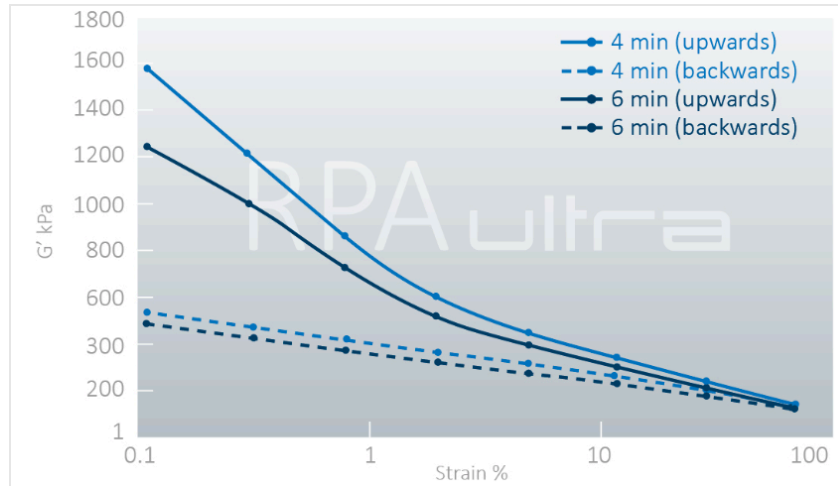


RPA Ultra Frequency Sweep Graph

The user thoroughly follows the viscoelastic behaviour and molecular structure by analyzing a sample over a broad range of frequencies (molecular weight and molecular weight distribution). Moreover, due to the sample's frequency-dependent behavior, several viscoelastic parameters, including complex modulus, elastic modulus, loss modulus, complex viscosity, phase angle, etc., are calculated at each frequency.



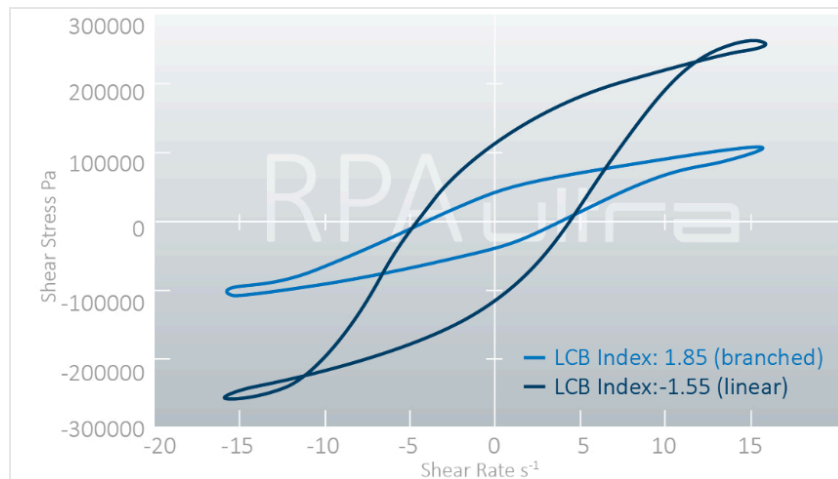
RPA Ultra Strain Sweep



RPA Ultra Strain Sweep Graph

A specimen's behaviour can be seen when it is measured over a broad strain range, such as the linear viscoelastic range (LVE) up to large amplitude oscillatory shear (LAOS). The Payne test, used to analyze the (filler/polymer) filler networks at low strain amplitudes, provides the details on the filler content and filler dispersion levels.

Large Amplitude Oscillatory Shear (LAOS)



RPA Ultra Large Amplitude Oscillatory Shear (LAOS) Graph



LAOS is a strain sweep used to examine and assess a sample's nonlinear viscoelastic behaviour at relatively large amplitudes.

The polymer architecture of a substance—linear or branched polymer—determines its nonlinear behaviour. For FT- Rheology, the LAOS data are also utilized. Using the harmonic spectrum from Fourier analysis, the LCB index (Long Chain Branching) or the Q parameter is calculated (FFT).

Advanced Rheometer Matrix-Test

One parameter (frequency or strain) is held constant while the other parameter (frequency or strain) is adjusted over a range in the frequency and strain sweeps previously mentioned. On top of that, due to the flexibility of matrix testing, which enables the user to alter both the frequency and strain during a sweep, more data can be obtained from a single measurement.



RPA Ultra Technical Specifications

Parameter	Value
Max. shear rate in rotation	500 1/s
Max. shear rate in oscillation	100 1/s
Max. ramp rat	1.33°C/s- > 80°C/m
Max. cool rat	0.5°C/
Die config	Sealed die, biconical and plate-plate
Drive system	High dynamic torque motor, High resolution controller
Oscillation frequency	0.001 to 100 Hz
Oscillation strain	+/- 0.001° to unlimited, +/- 0.014% to unlimited -> rotational
Temperature range	Ambient to 235°C
Measured data	Torque, temperature, frequency, strain; Optional: Normal force, die pressure
Caculated data	S', S'', S*, G', G'', G*, tan δ, phase angle, cure speed, η', η'', η*, ...
Die gap	0.45 mm nominal
Sample volume	4.5 cm ²
Electrical	400V/16A



Parameter	Value
Closing system	Soft closing to prevent foil rips and damage of test samples, optionally variable closing force
Torque range	0.0001 to 250 dNm
Normal force / Pressure (opt)	up to 10 kN
Subroutines	Isothermal, Non-Isothermal, Timed, Temperature Sweep, Strain Sweep, Frequency Sweep, Steady Shear, Relaxation, Hysteresis, Tension Test, LAOS, Matrix Test
Interface	Ethernet
Data points	Over 3500 data points available for each static subtest Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90 Integrated, automatic reporting features for dynamic tests
Pneumatics	min. 4.5 Bar (11.5 kN) / 60 psi

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