

RPA8000 Rubber Process Analyzer ASTM D6204, ASTM D5289, ASTM D6601, ISO 6502

Qualitest rubber process analyzer RPA8000 is an advanced dynamic mechanical rheological test instrument. The RPA8000 is designed to measure dynamic mechanical rheological characteristics of polymers and rubber compounds before during and after cure.

The RPA 8000 has many advantages over traditional rubber test methods due to the ability to test under conditions of variable strain frequency and temperature which reveal important differences in rheological, rheometric and dynamic viscoelastic properties. The versatility of this instrument allows for polymers and compounds to be comprehensively characterized, especially in terms of intrinsic material properties, processability characteristics and end product performance.

Specifications

Standards	Complies with ASTM D6204, ASTM D5289, ASTM D6601, ISO 6502
Temperature	Microprocessor controlled, ambient to 230°C (446°F)
Oscillation Strain	±0.14 to ±1256% (±0.01° to ±90° of arc)
Oscillation Frequency	0.0016 to 33Hz (0.1 to 2000rpm)
Torque Range	0.001 to 225dN-m (0-200lb-in)
Units of measure	Torque: S', S'' (N-m, dN-m, lb-in, kg-cm) Shear Modulus: G', G'', G* (Pa, MPa, psi) Temp: °C, °F Frequency: cpm, Hz, rad/s Strain: °arc, % Optional calculated results: η', η'', η*, j', j'', j* tanδ
Electrical	100/110/120/130VAC ±10%, 50/60±3Hz, 15amp single p 200/220/240/260VAC ±10%, 50/60±3Hz, 7.5amp single p
Dimensions (WxDxH)	70x80x130cm (28x32x53in.)
Weight	280kg (620lb)
Automation	Optional 100 sample auto loader available to automatically load and unload samples

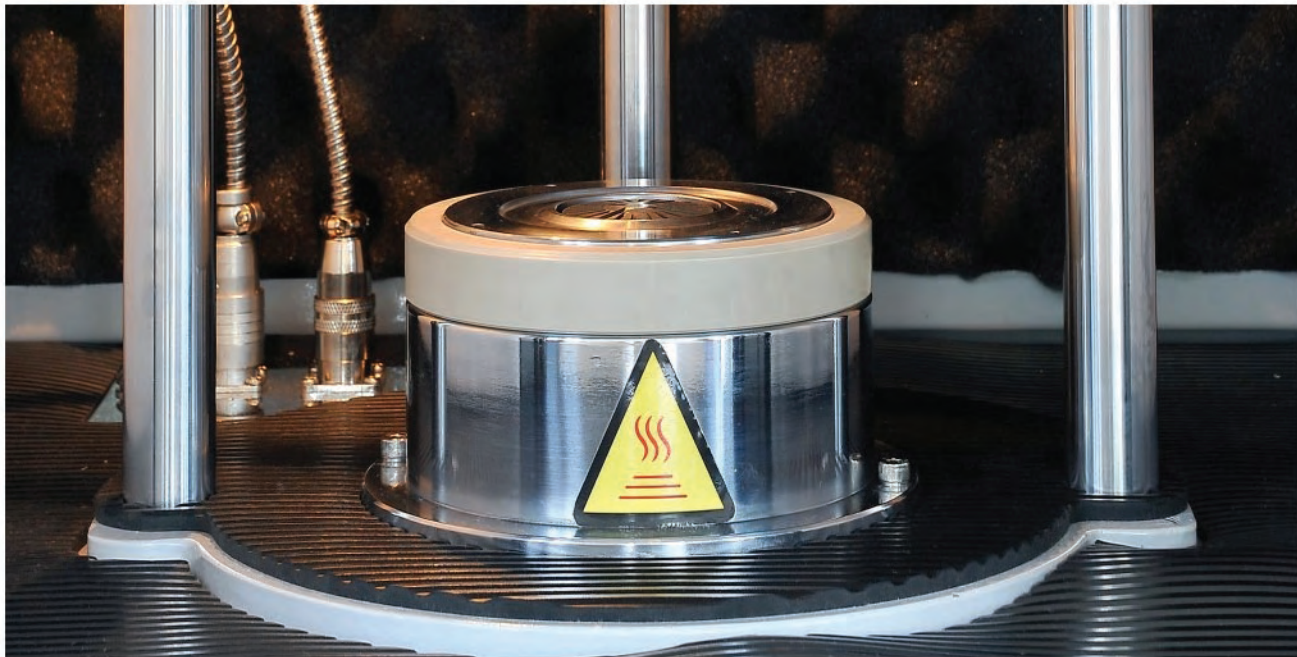


The optional auto loading fixture further improves the productivity of the RPA8000. This option allows for up to 100 samples to be measured without operator interference. The auto loading fixture consists of a rotary tray staging system, sample loading arm, film transport system and controller.

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Main application:

- Incoming polymer characterization
- Incoming raw material test
- Master batch testing
- Final compound testing
- Cured compound testing

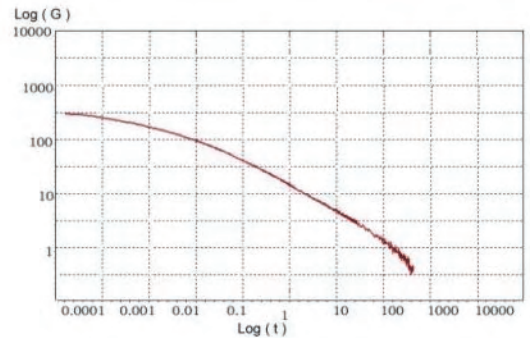


Application	Variable	Benefit
Polymer	Strain Frequency Stress Relaxation	Molecular weight distribution Ageing Consistent processing
Mixing	Strain	Dispersion Optimize cycle times Improved efficiency Reduced Scrap
Calandering/ Extrusion	Strain	Gauge control / Die swell
Injection Molding	Strain Frequency	Mold flow Mold fill Shear thinning
Cure	Temp	Optimized cycle times Minimized cycle times Maximum throughput
Post Cure	Temp Strain Frequency Stress relaxation	Damping Rolling resistance Heat build up

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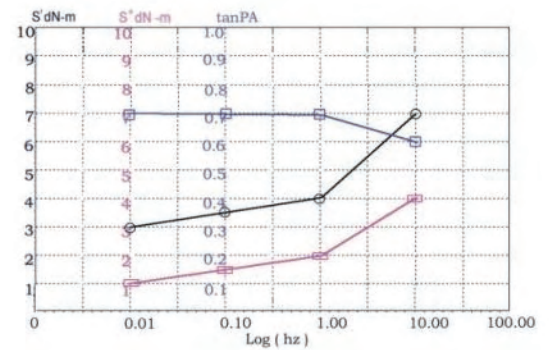
Variable Strain:

Strain is applied via the oscillating lower die, under full computer control. The strain angle can be precisely varied between 0.05° and 90° in 0.01° increments. Torque modulus and viscosity are measured at pre determined frequency and temperature.



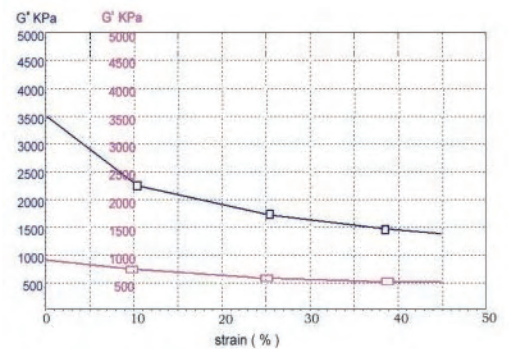
Variable Frequency:

The oscillation frequency of the applied strain can be varied with great accuracy between 0.03Hz and 33Hz. Torque, modulus and viscosity are measured at pre determined strain and temperature.



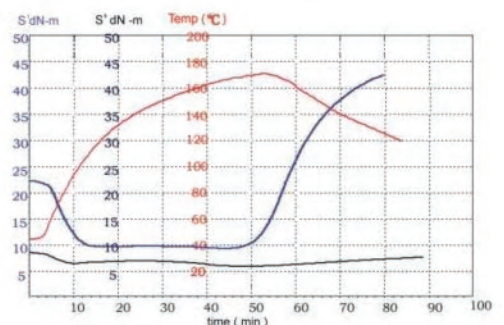
Variable Temperature:

During a test, the temperature can be varied between 20°C and 230°C with great precision. Torque, modulus and viscosity are measured under pre determined frequency and strain.



Stress Relaxation

Modulus and torque are measured vs. time after a sample has been subjected to a pre-programmed strain.



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The RPA's Role in the Rubber Industry

Industrial customers continue to demand rubber products with better quality and longer service life, often at lower cost. In response, the rubber industry seeks to improve manufacturing capability, reduce costs and increase product consistency. The RPA plays a key role in these activities, being used successfully in R&D, Products and Process Development, Manufacturing, Quality Control, and Polymer and Filler Production. The RPA has also been identified by quality improvement teams as the instrument of choice in six Sigma programs to drive down production costs.

Polymer Suppliers

- RPA is more discriminating than Mooney viscosity and Mooney stress relaxation
- Determines elastic and viscous polymer responses
- Differentiates Average Molecular Weight and Molecular Weight Distribution
- Sensitive to Long Chain Branching
- Short test times (eg. 3 mins) suited to QC testing
- Highly productive, low cost testing
- ASTM method for uncured materials
- RPA can be fully automated for optimum efficiency

Manufacturing

- RPA provides a fast and effective assessment of compound quality and processability characteristics
- The most sensitive gage in the rubber industry for measuring compound variation in production
- Ideal for implementation of SPC programs
- Proven track record in Six Sigma Programs
- Effective in determining assignable causes of variation, helping corrective action to reduce scrap and rework, and optimize processes
- Eclipse® Software can be added for effective "go" and "no go" operation
- Can be applied upstream and downstream in a production operation through an integrated communication network.
- Flexible and effective test conditions for all types of rubber compounds and process applications, from mixing through to molding
- Established ASTM method for compound processability characteristics

Product Development

- RPA provides a common language of quality information in supply chain, from Supplier to R&D, to Manufacturing, and the Customer.
- RPA is the most effective tool for demonstrating that new compound satisfy manufacturing needs whilst also meeting customer performance requirements

Unique applications for the RPA 8000

- Correlates with or substitutes for up to 26 traditional rubber testing instruments
- An RMA study showed better statistical test sensitivity than other rubber processing tests
- Allows comprehensive viscoelastic characterization of raw natural and synthetic rubbers
- Rapid processability testing for quality of mixed compounds and prediction of downstream processing properties
- Detects variations in mixing processes; sensitive to filler dispersion and polymer-filler interaction
- Multi-sequence tests measure uncured, curing, and after cure viscoelastic properties on a single sample. Assists early QA corrective action
- Variable temperature, strain and frequency allow factory processes to be closely simulated
- More sensitive scorch measurements using variable temperature analysis and high shear rates; correlates with real production experience
- Internationally recognized ASTM standards for RPA measurements

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More RPA Applications

- Correlates with high shear rates in processing
- Easier to use and more sensitive to dynamic property differences than traditional viscoelastic testers
- Detects Variations in phase mixing
- Quantifies compound bin storage stability
- A fast heat aging test, for both static and dynamic aging, including gel formation in polymers
- Simulates network breakdown and recovery effects in cured dynamic property measurements
- A diagnostic tool to assignable causes of variation in quality, enabling corrective actions to be implemented for quality improvement
- High strains permit assessment of chain entanglement effects which influence processing behavior
- Predicts die swell, extrudate stability, mold flow; measures stress relaxation; performs cure simulation at variable process temperature
- Post-cure properties correlate with hardness, resilience, modulus, heat build-up, rolling resistance, damping