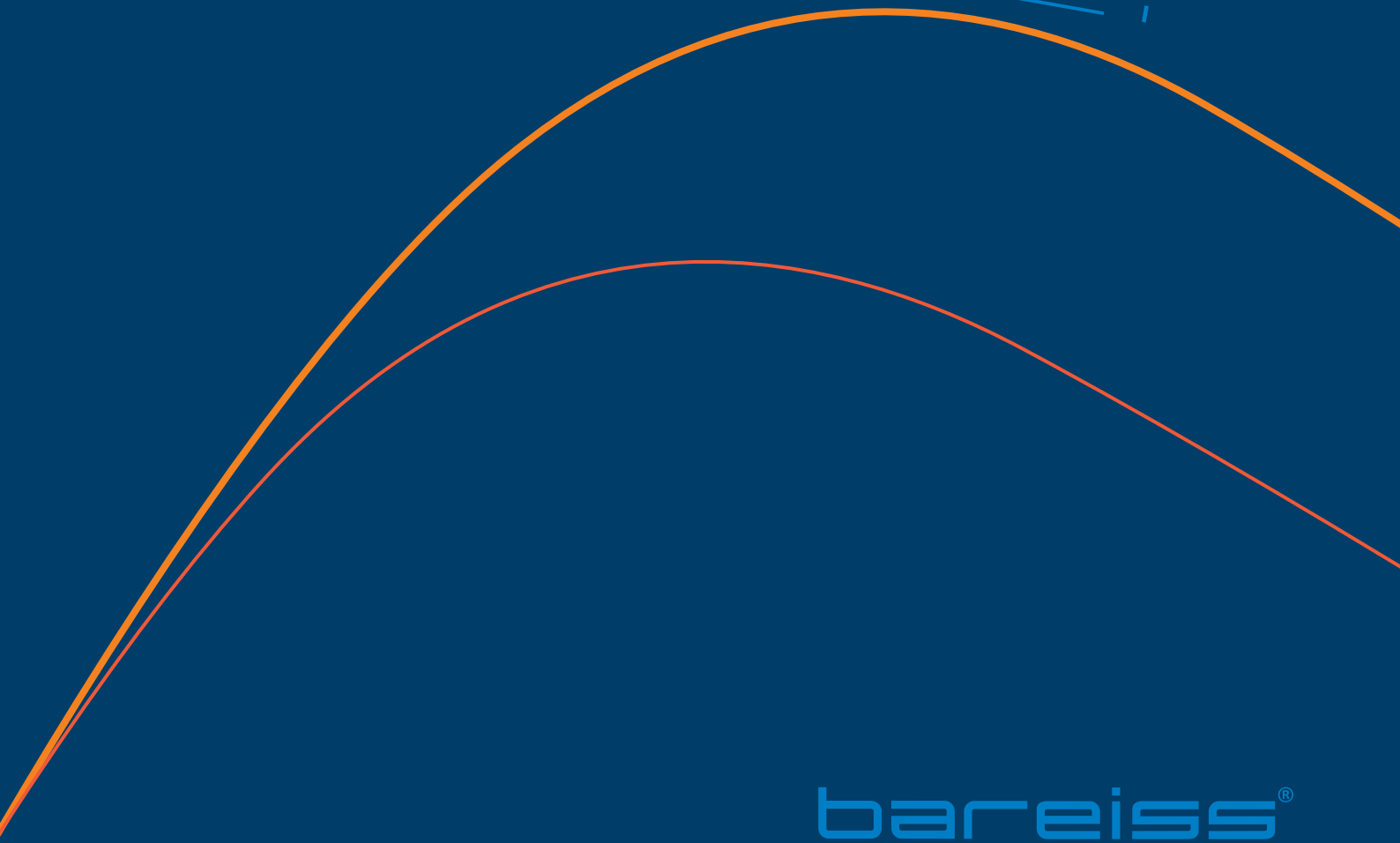
EN

REBOUND.

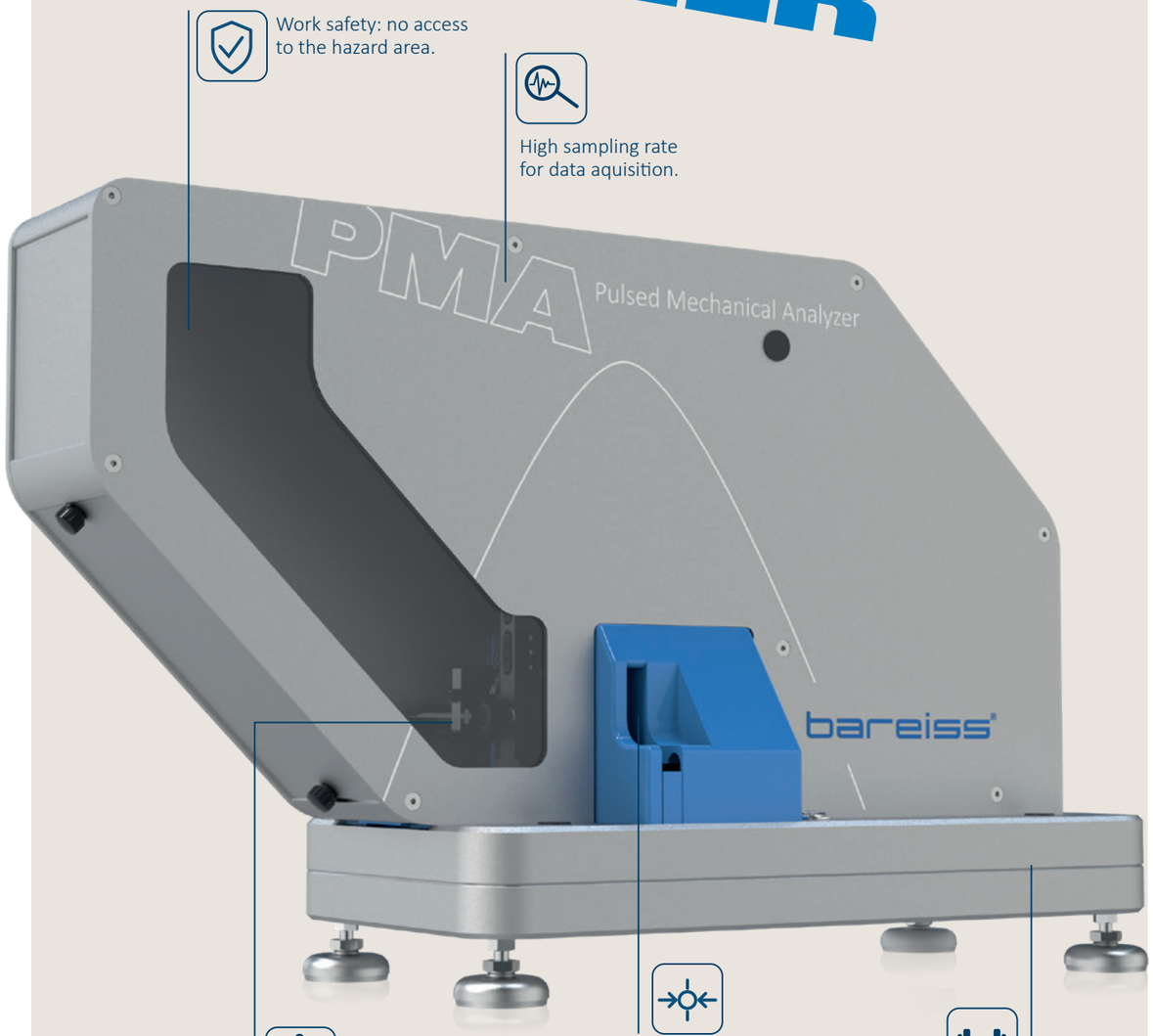
PULSE.
DEFORM.
ANALYZE.



bareiss®

Material testing. Trusted worldwide.

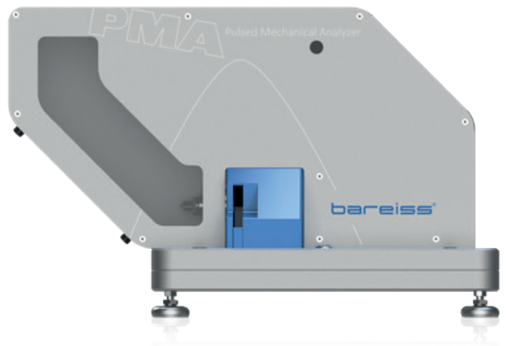
PULSED MECHANICAL ANALYZER



PMA – THE FUTURE HAS A PULSE.

The Pulsed Mechanical Analyzer (PMA) characterizes the dynamic material behavior under realistic, pulsed loads. It determines the Youngs's modulus and loss factor tan δ in the millisecond range at 100 Hz to 1 kHz – optionally also temperature-dependent.

This provides practical material data, including the glass transition temperature under dynamic stress. Fast, reproducible measurement makes the PMA ideal for development and quality control.



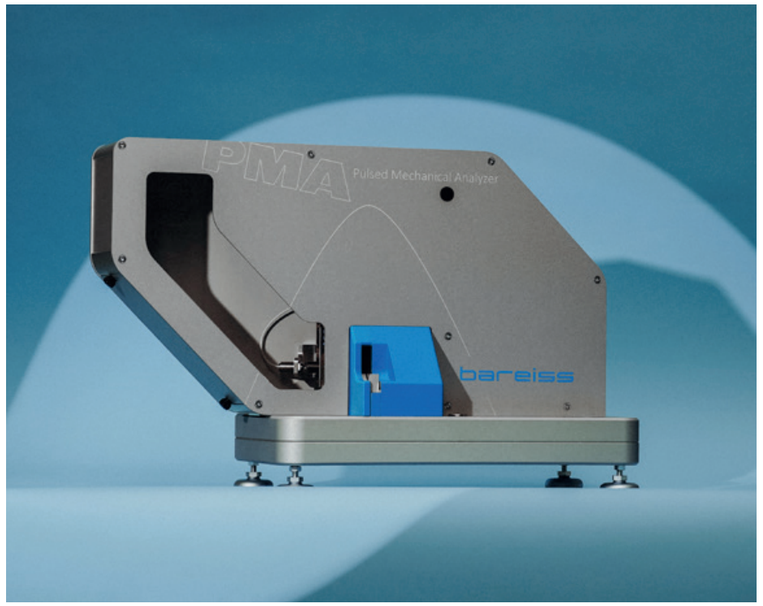
The PMA combines standards-based measurement with state-of-the-art material characterization at the highest level.

KEY FEATURES

THE FUTURE HAS A PULSE. A NEW ERA OF MATERIAL CHARACTERIZATION.

This newly developed and globally unique measurement method expands the classic rebound elasticity tester with crucial analysis functions. In addition, the device was structurally adapted to meet the requirements of the demanding measurement process. It enables fast, practical product specification and reveals material properties that were previously impossible to measure.

By determining the modulus of elasticity and loss factor, the system becomes a fully-fledged pulsed mechanical analyzer—for the reliable characterization of materials under real conditions.

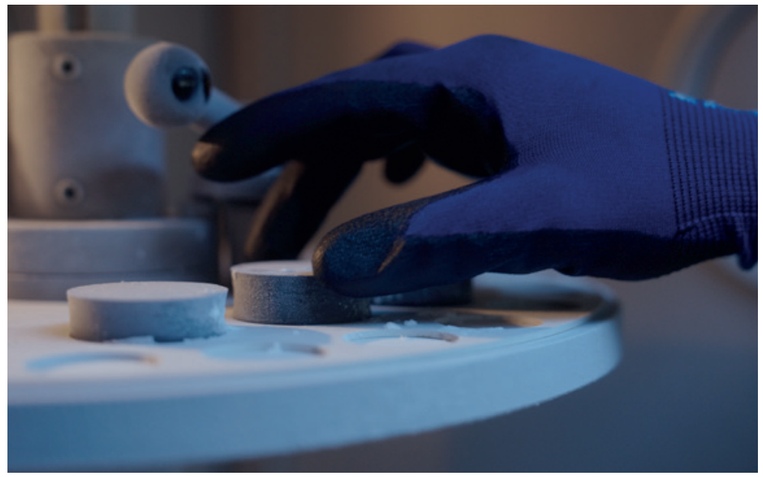


AUTOMATED MEASUREMENT. SAVE TIME. AVOID ERRORS.

A fully automated measurement process starts at the touch of a button: The sample aligns itself automatically, user influence is eliminated, and sources of error are minimized. The modulus of elasticity and loss factor are determined precisely and reproducibly without manual intervention.

For maximum deformations of 20–80% occurring within milliseconds, temperature changes of up to 60 K in the material can be measured within 20 minutes.

Temperature-dependent measurements can be easily performed down to –50 °C using a standard laboratory freezer – without the need for complex temperature control systems.



TEMPERATURE-DEPENDENT MEASUREMENT RESULTS – PRECISELY DOCUMENTED

The integrated temperature sensor automatically records the temperature at each measuring point. Recording takes place continuously between individual measurements, with the temperature interval being flexibly definable.

Whether at high or low temperatures – all relevant material properties are determined reliably and reproducibly.

BareissOne – THE INTELLIGENT SOFTWARE FOR YOUR TESTING PROCESSES

Create structured test plans, perform guided measurements, and analyze results centrally. Available as a single-user or server-client solution, with a central database and user management. In addition to Bareiss devices, selected third-party devices can also be integrated, depending on the interface. For maximum transparency, comparability, and process reliability.

FROM VISION TO REALITY – MADE IN GERMANY.

From identifying the requirements to the detailed mechanical design, Bareiss developed the Pulsed Mechanical Analyzer in collaboration with experts.

Manufactured with German craftsmanship, every PMA is consistently designed for minimal mechanical friction. The result: highest measurement accuracy, maximum reproducibility, and consistently reliable test results.

DYNAMIC MATERIAL CHARACTERIZATION UNDER REAL-WORLD CONDITIONS.

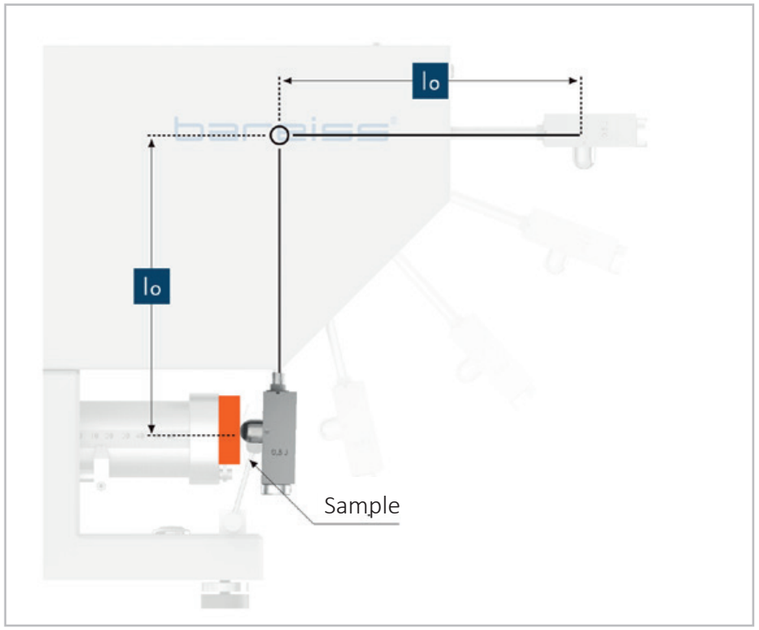
The Pulsed Mechanical Analyzer (PMA) is a sophisticated testing device for detailed analysis of the dynamic mechanical behavior of elastomers and other viscoelastic materials. Unlike traditional dynamic mechanical testing methods, the PMA simulates real-world loading scenarios as they actually occur in technical applications: short-term, impulse-like stresses with high deformation rates. As a result, the system provides material data that is not only theoretically relevant, but also directly practical and application-oriented.

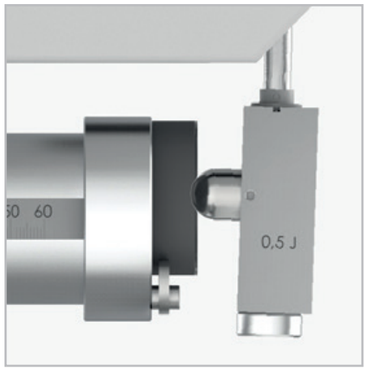
The measurement focuses on determining the complex modulus of elasticity and the loss factor tan δ. These characteristic values are recorded in the millisecond range and thus cover a frequency range from 100 Hz to 1 kHz. This frequency range is particularly important for realistically representing the behavior of rubber components under fast, dynamic load changes. In addition, the PMA enables measurements at increased deformations, allowing the high pulsed deformations that frequently occur in reality in dynamically loaded components to be reliably recorded – an aspect that plays a central role in many real-world applications.

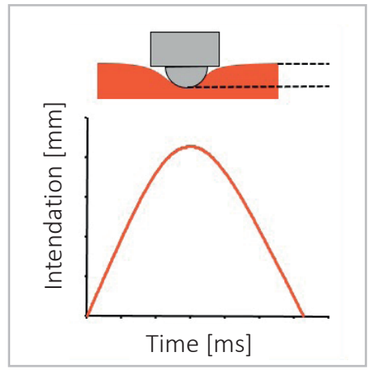
A honeybee's wingbeat lasts only about 5 milliseconds.

For applications where the low-temperature behavior of elastomers is critical, the PMA offers another decisive advantage: temperature-dependent analysis. Measurements can be performed over a wide temperature range, allowing the glass transition temperature (Tg) to be precisely determined under realistic, pulsed deformation conditions. This practical Tg determination provides valuable information about how a material behaves in cold conditions – a factor that is of central importance in seals, bearings, vibration elements, or chassis components, for example.

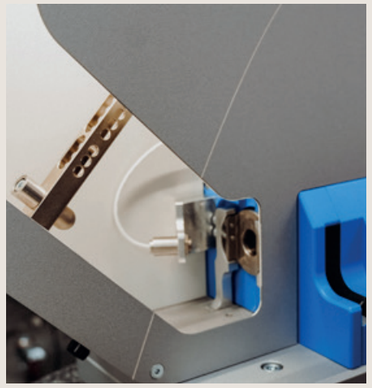
The combination of high temporal resolution, realistic load profiles, and the possibility of temperature-dependent measurements makes the PMA a powerful tool for research, development, and material optimization. Design engineers and material developers obtain accurate data that enables the reliable design of dynamically stressed components. This helps to identify material weaknesses, predict service life more accurately, and make material selection significantly more informed.

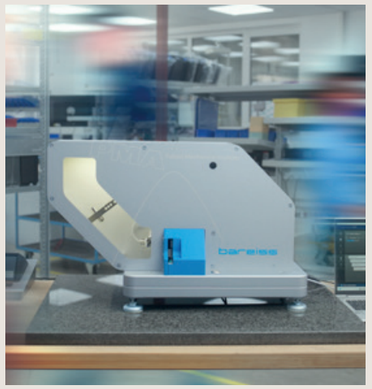






In addition to its technical performance, the PMA impresses with its ease of use and high reproducibility. Measurements can be performed quickly, require minimal effort, and still deliver extremely accurate results. These features make the system attractive not only for laboratory environments, but also predestine it for use in quality control. In the production environment, the PMA enables efficient and dependable evaluation of material behavior, allowing deviations to be detected at an early stage and ensuring long-term process stability.

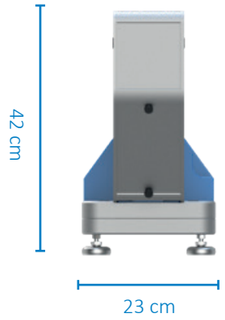


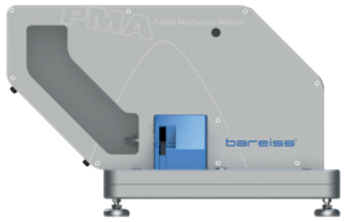


The Pulsed Mechanical Analyzer thus combines scientific precision with industrial practicality. It provides dynamic material characteristics that correspond to real-world conditions, creating a solid basis for informed decisions in development, production, and quality assurance.

SPECIFICATIONS

ASTM D7121 | DIN 53512 | DIN 4662





Dimensions
L x W x H: 66 X 23 X 42 cm

Weight approx. 53 kg

Resolution	0.01%
Contact time	0,2 – 20 ms
Frequency range	50 – 5000 Hz
Constant deformation energy	0,5 J
Indentation depth*	0,3 – 6 mm
Force range	40 – 4000 N
Temperature range	– 50 °C to + 100 °C
Heating and cooling	via external temperature control unit
Samle thickness	6 – 13,2 mm
Sample diameter	35 – 45 mm
Test modes	Temperature sweep Time sweep
Calculated Parameters	Indentation depth Force Energy W_{el}, W_{diss} Rebound resilience E' , E", E*, tan δ, J', J"
Shear stress	τ_{eff} and τ_{max}
Shear deformation	γ_{eff} and γ_{max}
Pendulum length	200 mm
Drop angle	90°
Impact velocity	2 m/s
Interface	2 x USB

* Depending on the Young's modulus of the specimen.

SOFTWARE

ONE SOLUTION FOR EVERYTHING.

bareissone

BareissOne is the intuitive software solution for managing every aspect of your measurement processes. Measurement parameters can be configured in just a few steps, while test plans for recurring or standardized procedures are created quickly and easily.

The integrated analysis tools provide comprehensive evaluation of your measurement data. A wide range of parameters—including rebound, V0, V1, contact time, maximum indentation depth, maximum force, elastic modulus, tan δ, and temperature—can be selected individually and supplemented with optional tolerance limits. Detailed single-value displays and powerful analysis functions provide in-depth insight into every measurement and enable direct comparison of different specimens.

For maximum flexibility, raw data can be exported conveniently in .xlsx or .csv format. BareissOne brings everything together in a single software platform—efficient, intuitive, and powerful.

BareissOne PROVIDES ACCESS TO THE ORIGINAL MEASUREMENT DATA, INCLUDING FORCE–DISPLACEMENT CURVES.

SELECTABLE TAGS IN BareissOne

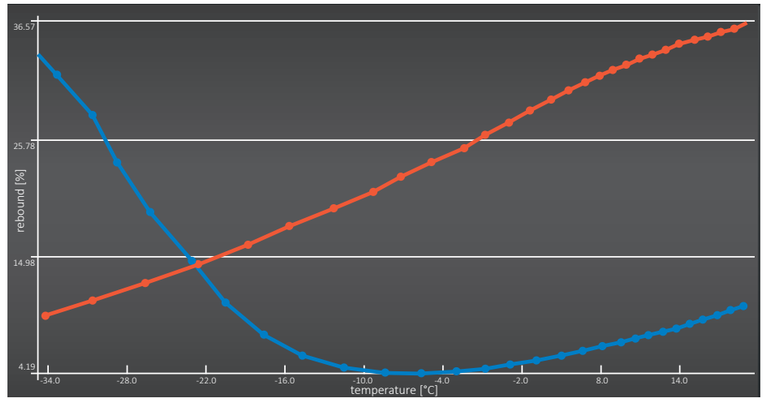


Figure 1

REBOUND AS A FUNCTION OF TEMPERATURE

The temperature-dependent measurements reveal significant differences between summer and winter tires, both in their damping behavior (see Fig. 3) and in their elastic modulus values (see Fig. 2).

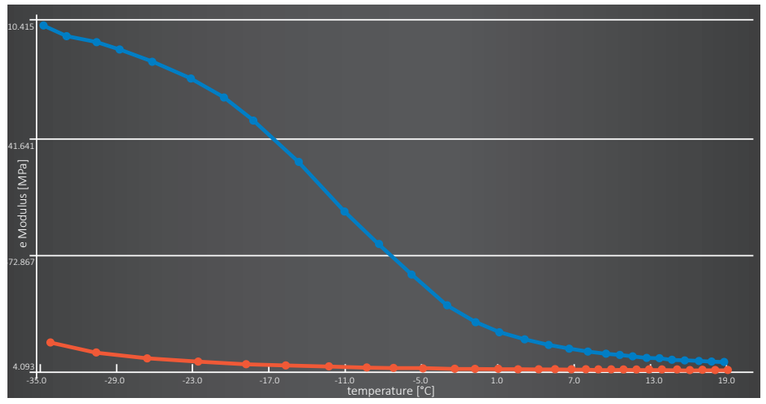


Figure 2

E-MODULUS AS A FUNCTION OF TEMPERATURE

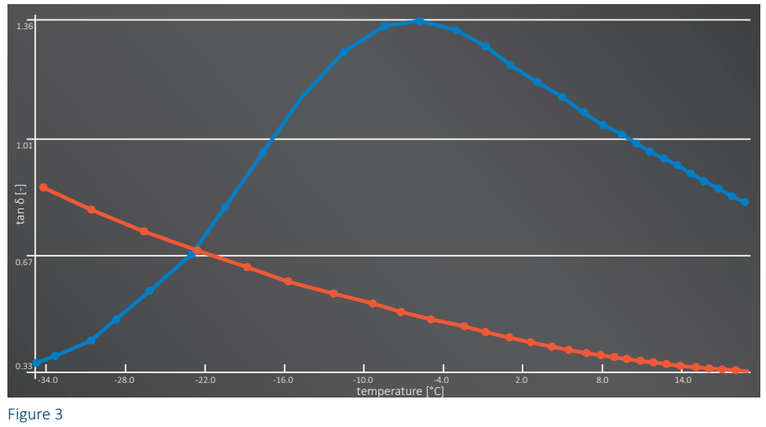


Figure 3

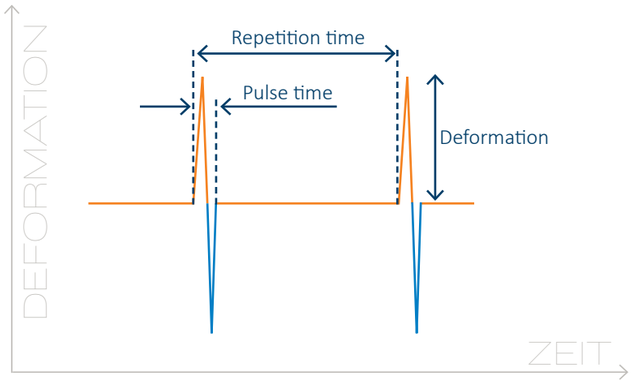
TAN δ AS A FUNCTION OF TEMPERATURE

The temperature-dependent tan δ curve indicates the material's glass transition. In this example, the glass transition is clearly visible in the summer tire.

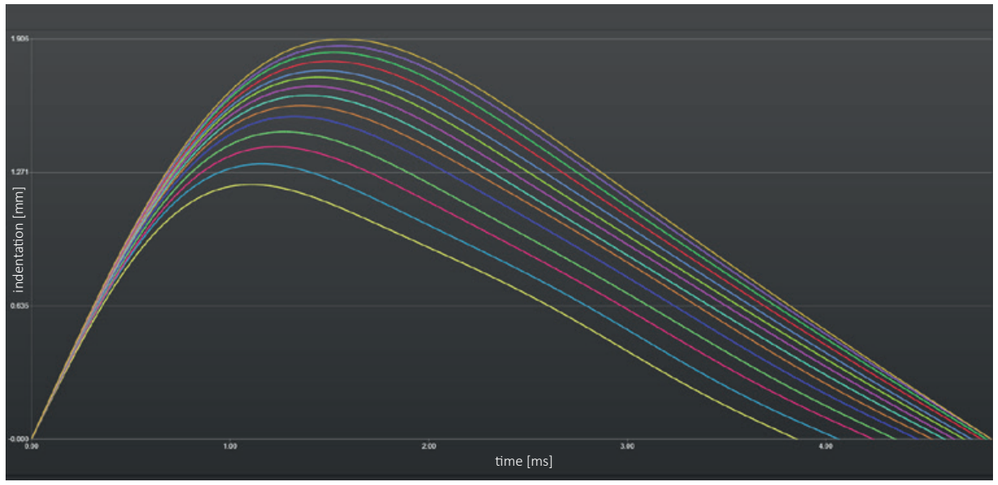
Summer tire

Winter tire

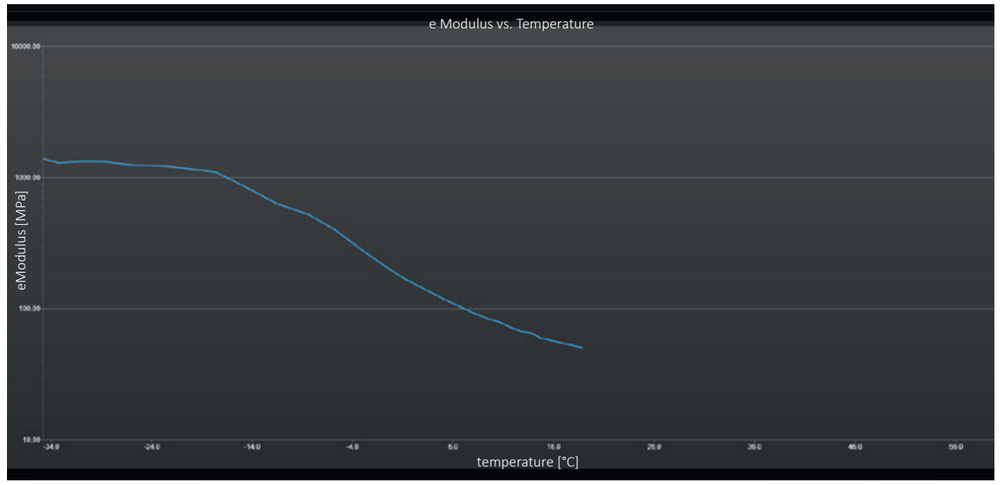
TREAD ANALYSIS OF A TYPICAL SUMMER TIRE.



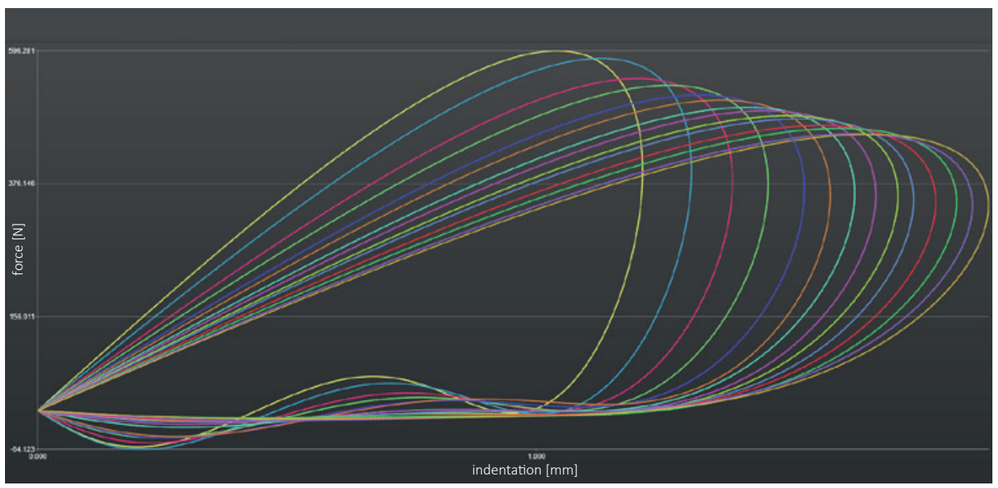
MEASUREMENT SIGNAL indentation depth as a function of time at different temperatures.



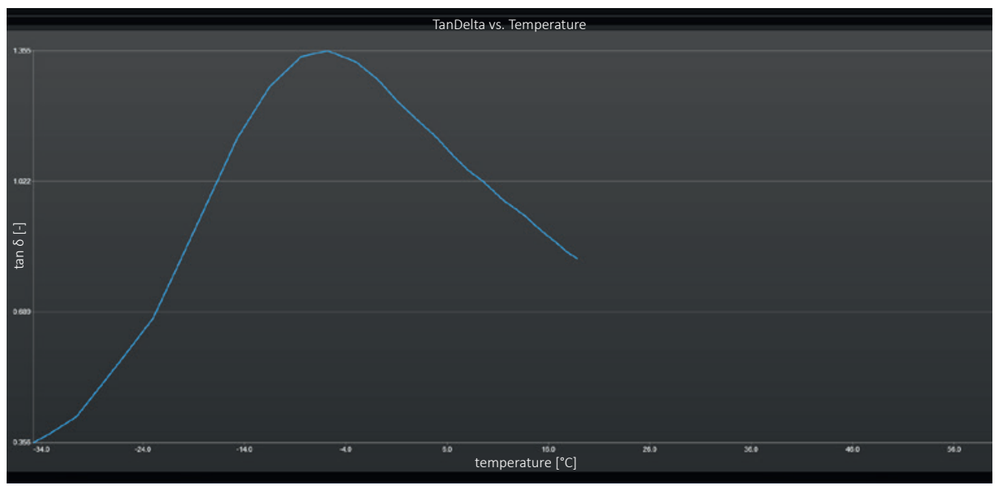
Elastic modulus as a function of temperature for contact times in the millisecond range.



Hysteresis curves calculated from the measurement data at different temperatures.



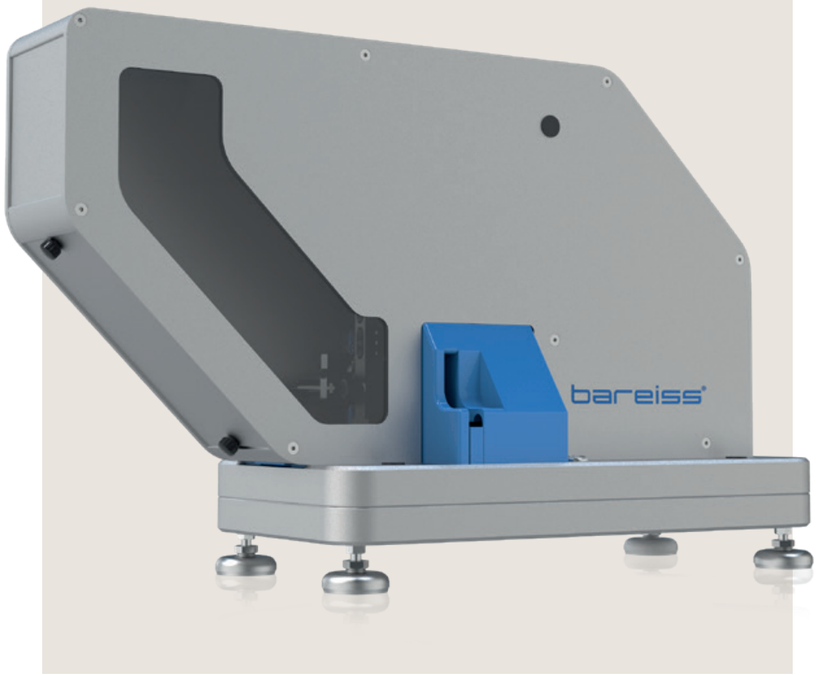
The temperature-dependent loss factor as a measure of the glass transition temperature under pulsed deformation.



REBOUND RESILIENCE TESTER

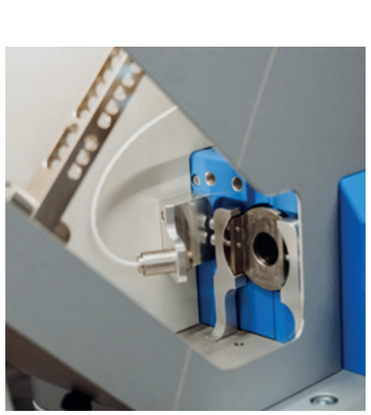
RRT 12

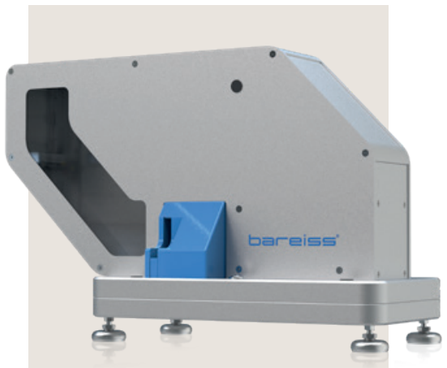
ASTM D7121: 2018 | DIN 53512: 2000 | ISO 4662: 2017



MEASURING METHOD
Schob Pendulum Principle

AREAS OF APPLICATION
Method for determining the elastic behavior of elastomers.



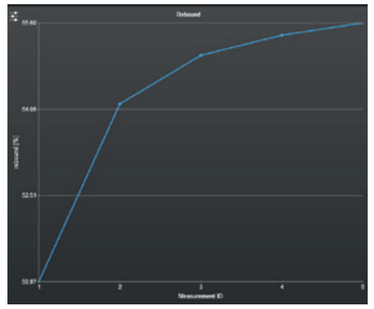


The rebound resilience tester automatically determines the elasticity of elastomers and similar materials. After pressing the start button, the specimen is inserted and clamped automatically. The measurement process then begins and runs fully automatically, ensuring reliable, operator-independent results with minimal effort.

The automatic specimen feed minimizes operator influence to an absolute minimum. The RRT 12 automatically detects the specimen thickness and clamps the specimen with a clamping force of 200 N accordingly. This ensures reproducible measurement results, independent of the user performing the test.

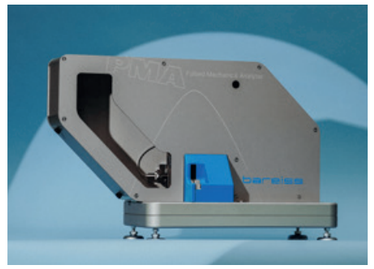
AUTOMATIC SPECIMEN FEEDING

Designed for effortless day-to-day operation: automatic specimen feeding and clamping minimize operator influence to an absolute minimum. Measurements can be started directly via the electronic control unit or, optionally, through the BareissOne software.

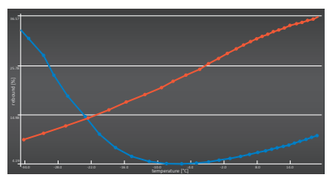


VARIOUS MEASUREMENT MODES

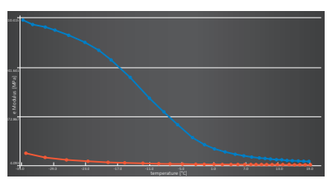
In addition to standard-compliant testing, the system also supports user-defined measurement procedures. A key advantage is that the results obtained during preconditioning are displayed and can be included in the evaluation, providing deeper insight into the material's behavior and enabling more comprehensive analysis.



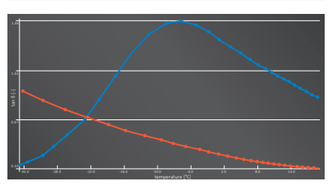
UPGRADEABLE TO A PULSED MECHANICAL ANALYZER
The new and globally unique measurement technology enhances the traditional rebound resilience tester with powerful analytical capabilities. By adding the comprehensive software package, the standard rebound resilience tester can be upgraded to a fully functional Pulsed Mechanical Analyzer (PMA).



Rebound as a function of temperature.



E-modulus as a function of temperature.



tan δ as a function of temperature.

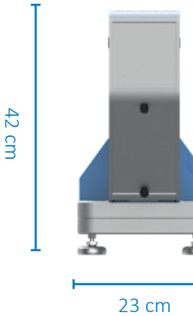
SPECIFICATIONS

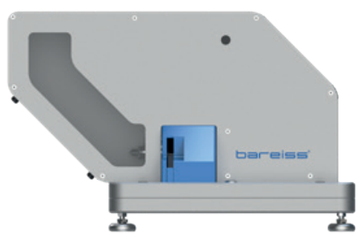
Specimen thickness: 6 – 13,2 mm
Specimen diameter: 35 – 45 mm

Resolution: 0,01 % rebound elasticity

Interface: USB, RS232

Pendulum length: 200 mm
Drop angle: 90 Grad
Impact velocity: 2 m/s





Dimensions
L x W x H: 66 X 23 X 42 cm

Weight approx. 53 kg

TRUSTED WORLDWIDE.

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www.bareiss.de

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-K-15206-01-00

The accreditation is valid for the scope listed in certificate D-K-15206-01-00 (mechanical measurands in the range of hardness).

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

2022/2023 INNOVATIVE THROUGH RESEARCH BAREISS Prüfgerätebau

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