GABOMETER®
Intelligent Universal Flexometer

Analyzing & Testing
Our GABOMETER® system – developed on the basis of the established Goodrich Flexometer – provides accurate measurements of heat build-up as well as blow-out tests and determination of the thermal set. Both, force- and elongation-controlled tests can be carried out with this state-of-the-art flexometer. The GABOMETER® is well suited to the task of improving the thermal dissipation and durability of semi-finished tire components, dampers or absorbers. Optionally, the new generation can also measure a material’s stiffness (E modulus) and damping (tan δ) values.

- Pair of insulated compression sample holders aimed for Flexometer tests equipped with a contact thermocouple for recording the sample temperature on the surface of the test specimen during heat build-up tests
- Recording of the sample “centre” temperature within the core of the test specimen during heat build-up tests with a needle type thermocouple (horizontal operation) manual mode (optional)
- Automatic recording of the sample “centre” temperature within the core of the test specimen after heat build-up tests with a needle type thermocouple (vertical operation) driven by a pneumatic penetration system in an automatic mode (optional)
- Heat build-up and blow-out tests according to Goodrich (DIN 53 533, ASTM D 623, ISO 4666/3, ISO 4666/4, BS 903 part A50 and JIS K 6265)

- Compression set

- Dynamic visco-elastic properties*

- Tension flexometer tests*

- Fatigue tests*

- Programmable generator board for variable waveforms with automatic self-adjusting signal shape feedback loop*

- Creep test*

- Triple temperature measurement
  - Temperature sensor underneath the sample (standard)
  - Temperature sensor for chamber control (standard)
  - Temperature sensor at the core of the sample (needle type)*

* Optional
Your Advantages

- Heat build-up and blow-out tests according to Goodrich (DIN 53 533, ASTM D 623, ISO 4666/3, ISO 4666/4, BS 903 part A50 and JIS K 6265)
- Goodrich flexometer tests
- Static: Strain- or stress-controlled load mode
- Dynamic: Strain- or stress-controlled load mode
- Wide frequency range*
- Wide temperature range*
- Automatic sample changer (ASC) for fully automatic testing (24h)*
- Simultaneous measurement of the visco-elastic properties*
- Visco-elastic properties in DMA mode*
- Hysteresis analysis*
- Pulse load mode*

* optional
GOODRICH FLEXOMETER TESTS

COMPRESSION

DYNAMIC DMA TESTS

TENSION

Heat build-up of ASTM D 623 SBR reference

Glass transition

Dynamic strain sweep up to 100 %
Measuring Principle

The phase-shift between force and strain is a measured amount in DMA mode.

Automatic Sample Changer (ASC) Option

The optional automatic sample changer comprises a compression magazine for up to 60 specimens. A robot grip system pulls the samples out of the magazine and transfers them to the GABOMETER®.
## Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>GABOMETER® 2000</th>
<th>GABOMETER® 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test specimen size (diameter/thickness)</td>
<td>17.8 mm/25 mm</td>
<td>30 mm (&lt; 40 mm optional)/25 mm</td>
</tr>
<tr>
<td>Static load drive</td>
<td>Shaker for servo motor</td>
<td>Shaker for servo motor</td>
</tr>
<tr>
<td>Dynamic load drive</td>
<td>Electrodynamic shaker system</td>
<td>Electrodynamic shaker system</td>
</tr>
<tr>
<td>Frequency range</td>
<td>30 Hz 0.5 up to 50 Hz continuously*</td>
<td>30 Hz 0.5 up to 50 Hz continuously*</td>
</tr>
<tr>
<td>Static strain range</td>
<td>up to 60 mm</td>
<td>up to 60 mm</td>
</tr>
<tr>
<td>Dynamic strain range</td>
<td>± 1.5 mm up to ± 10 mm</td>
<td>± 1.5 mm up to ± 10 mm</td>
</tr>
<tr>
<td>Force range</td>
<td>up to 2000 N</td>
<td>up to 4000 N</td>
</tr>
<tr>
<td>Temperature range</td>
<td>(-160°C, optional) RT up to 300°C</td>
<td>(-160°C, optional) RT up to 300°C</td>
</tr>
<tr>
<td>Temperature measurement</td>
<td>Mode A: Temperature in the furnace PT 100 or type K thermocouple</td>
<td>Mode A: Temperature in the furnace PT 100 or type K thermocouple</td>
</tr>
<tr>
<td></td>
<td>Mode B: Temperature at the bottom of the cylindrical test specimen (type K thermocouple)</td>
<td>Mode B: Temperature at the bottom of the cylindrical test specimen (type K thermocouple)</td>
</tr>
<tr>
<td></td>
<td>Mode C: Vertical needle-type thermocouple at the center of the sample after measurement with automatic pneumatic drive*</td>
<td>Mode C: Vertical needle-type thermocouple at the center of the sample after measurement with automatic pneumatic drive*</td>
</tr>
<tr>
<td></td>
<td>Mode D: Horizontal needle-type thermocouple at the center of the sample during measurement with manual mode*</td>
<td>Mode D: Horizontal needle-type thermocouple at the center of the sample during measurement with manual mode*</td>
</tr>
<tr>
<td>Measurement</td>
<td>▪ Heat build-up or blow-out of the test specimen</td>
<td>▪ Heat build-up or blow-out of the test specimen</td>
</tr>
<tr>
<td></td>
<td>▪ Compression set</td>
<td>▪ Compression set</td>
</tr>
<tr>
<td></td>
<td>▪ Energy loss*</td>
<td>▪ Energy loss*</td>
</tr>
<tr>
<td></td>
<td>▪ Visco-elastic properties only during the heat build-up tests (E’, E”, tan δ, E*)*</td>
<td>▪ Visco-elastic properties only during the heat build-up tests (E’, E”, tan δ, E*)*</td>
</tr>
<tr>
<td>DMA Mode</td>
<td>Visco-elastic properties (E’, E”, tan δ, E*)*</td>
<td>Visco-elastic properties (E’, E”, tan δ, E*)*</td>
</tr>
<tr>
<td>Autosampler</td>
<td>▪ Magazine for 20 to 60 compression samples*</td>
<td>▪ Magazine for 20 to 60 compression samples*</td>
</tr>
<tr>
<td></td>
<td>▪ Tension, bending, shear tests for DMA*</td>
<td>▪ Tension, bending, shear tests for DMA*</td>
</tr>
<tr>
<td>Electrical supply</td>
<td>3 phases, 400 V, 50/60 Hz, 32A</td>
<td>3 phases, 400 V, 50/60 Hz, 32A</td>
</tr>
<tr>
<td>Max. dimensions (height x width x thickness)</td>
<td>1800 mm x 1200 mm x 1200 mm</td>
<td>1800 mm x 1200 mm x 1200 mm</td>
</tr>
<tr>
<td>Max. weight</td>
<td>1300 kg</td>
<td>1300 kg</td>
</tr>
</tbody>
</table>

* optional
The NETZSCH Group is an owner-managed, international technology company with headquarters in Germany. The Business Units Analyzing & Testing, Grinding & Dispersing and Pumps & Systems represent customized solutions at the highest level. More than 3,700 employees in 36 countries and a worldwide sales and service network ensure customer proximity and competent service.

Our performance standards are high. We promise our customers Proven Excellence – exceptional performance in everything we do, proven time and again since 1873.

When it comes to Thermal Analysis, Calorimetry (adiabatic & reaction), the determination of Thermophysical Properties, Rheology and Fire Testing, NETZSCH has it covered. Our 50 years of applications experience, broad state-of-the-art product line and comprehensive service offerings ensure that our solutions will not only meet your every requirement but also exceed your every expectation.

Proven Excellence.

NETZSCH-Gerätebau GmbH
Permanent Establishment Ahlden
Schulstr. 6
29693 Ahlden
Germany
Tel.: +49 5164 8019-0
Fax: +49 5164 8019-30
info.ngi@netzsch.com

www.netzsch.com