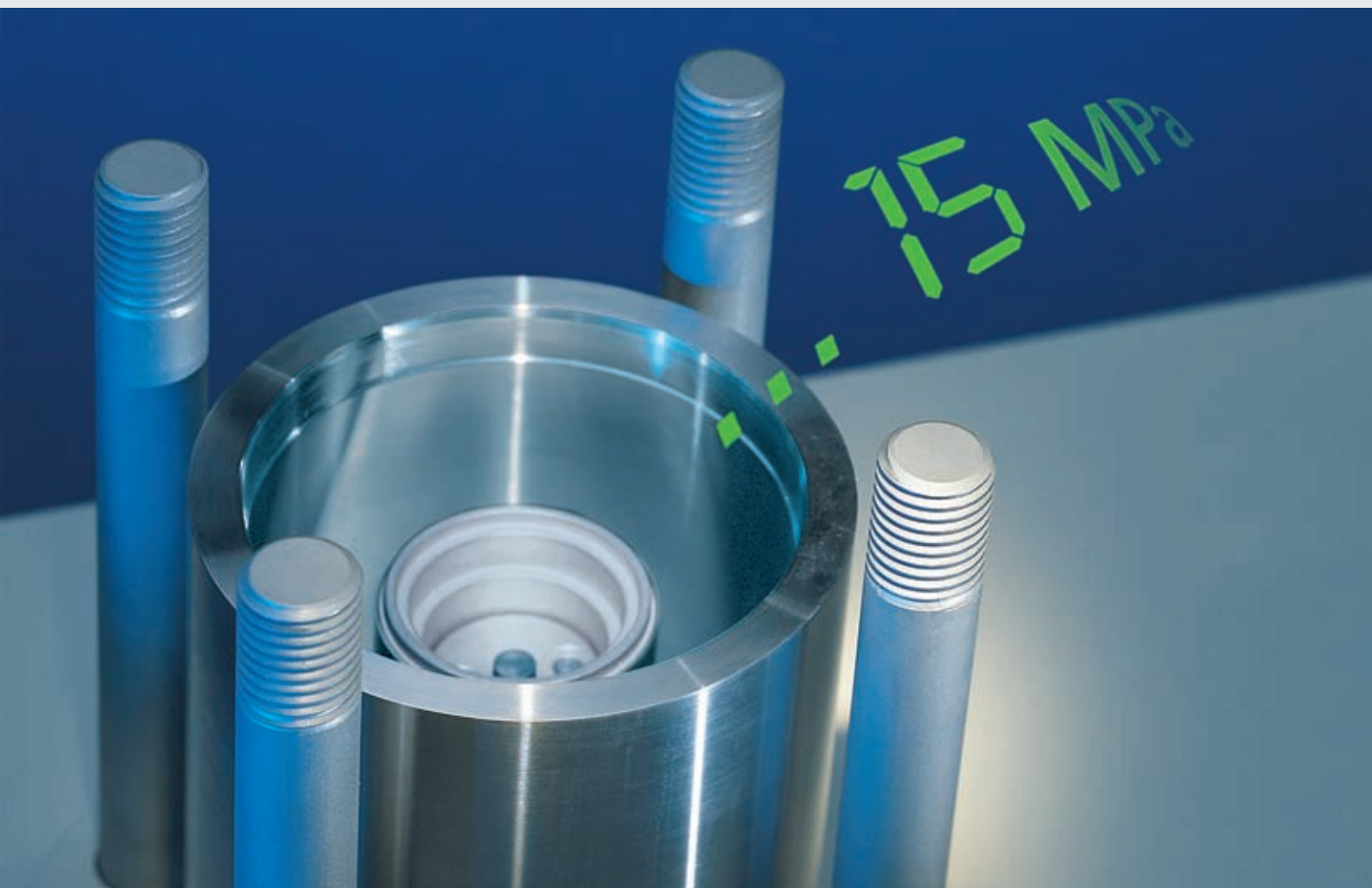


**NETZSCH**

High-Pressure Differential Scanning Calorimetry



Leading Thermal Analysis. ■

**DSC 204 HP**  
up to 15 MPa

# DSC 204 HP *Phoenix*<sup>®</sup> - Versatile High-Pressure DSC

Numerous physical processes and chemical reactions are influenced by atmospheric pressure. In practice it is therefore often necessary to conduct DSC measurements under pressure.

With the high-pressure DSC 204 HP *Phoenix*<sup>®</sup> thermal effects of a sample can be analyzed in the pressure range of **vacuum to 15 MPa** (approx. 2140 psi) from -150 °C to 600 °C. The reliable CC 200 L control cooling system is available for this temperature range.

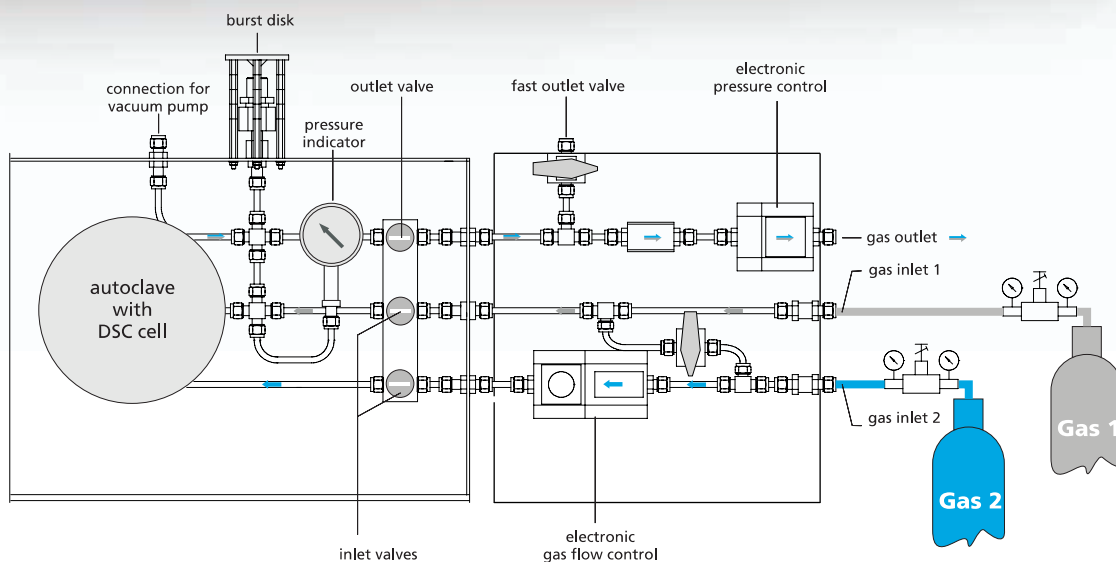
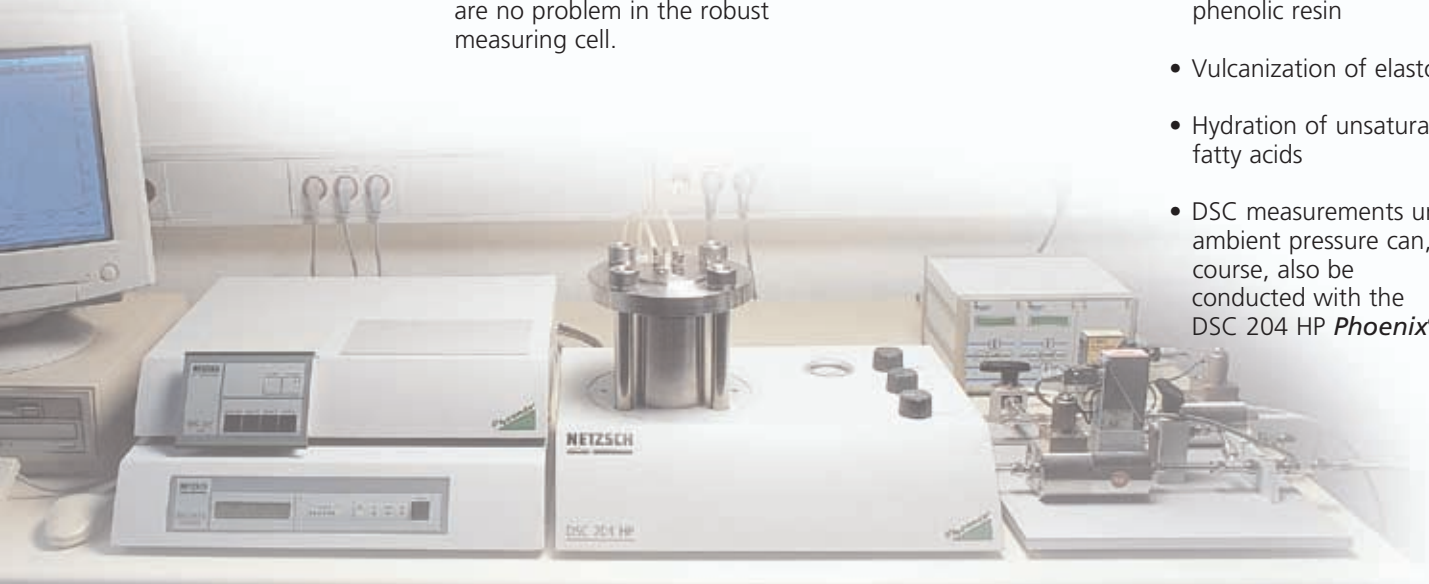
Measurements in different gas atmospheres such as O<sub>2</sub>, N<sub>2</sub>, Ar, He, H<sub>2</sub>, CO<sub>2</sub> and CH<sub>4</sub> are no problem in the robust measuring cell.

The sample atmosphere is either static or dynamic. The electronic pressure control device as well as exact regulation of the purge gas flow are the main features for outstanding accuracy and reproducibility of the measurements. Of course, the DSC 204 HP *Phoenix*<sup>®</sup> meets all safety requirements which are required for measurements under pressure.

An array of crucibles in various sizes, shapes and materials for different applications is also available.

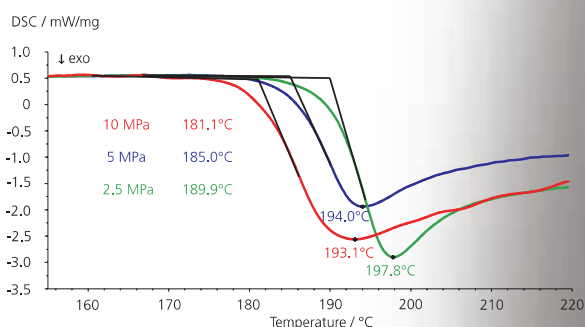
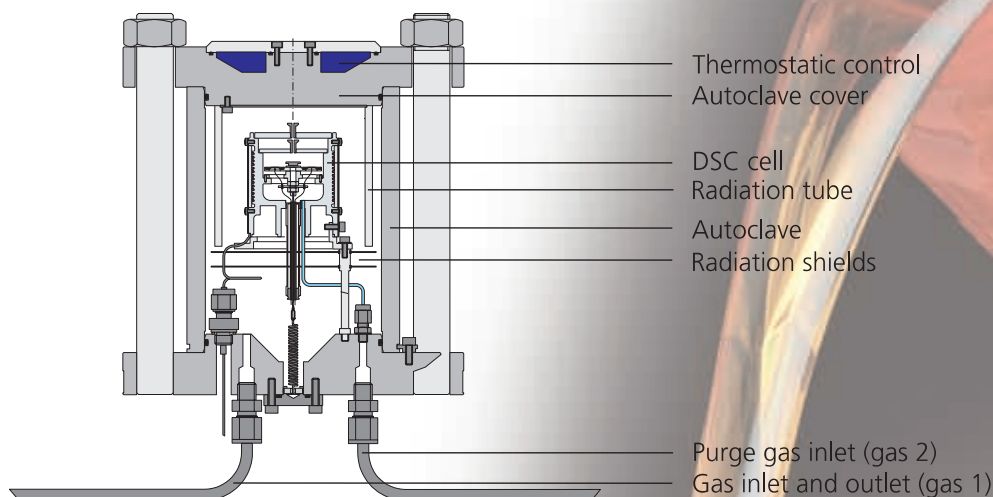
## Wide-ranging applications

- Determination of vapor pressure and evaporation heat (ASTM E 1782)
- Separation of reactions with overlapped evaporation
- Measurement of adsorption and desorption, e.g. on metallic compounds
- Oxidation stability of oils, fats and lubricants (ASTM E 1858, ASTM D 6186, ASTM E 2009, ASTM D 5483)
- Curing of thermosets, e.g. phenolic resin
- Vulcanization of elastomers
- Hydration of unsaturated fatty acids
- DSC measurements under ambient pressure can, of course, also be conducted with the DSC 204 HP *Phoenix*<sup>®</sup>

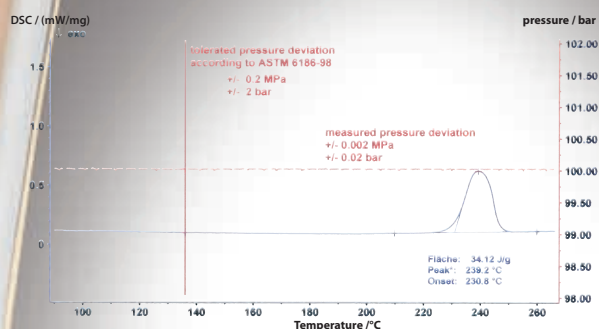


# Wide-ranging Applications

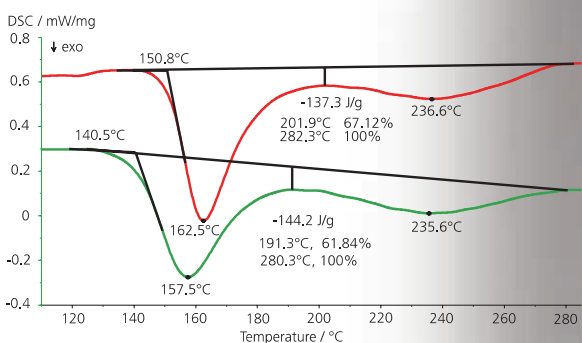
DSC 204 HP *Phoenix*® measuring part



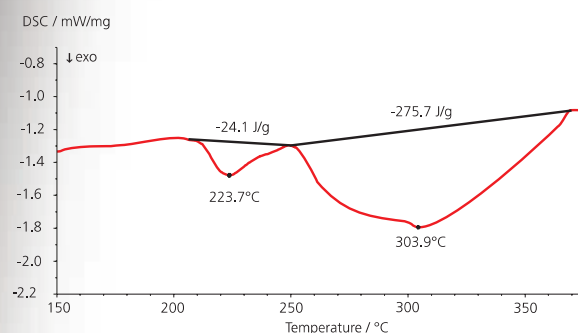
Oxidation behavior of a stabilized synthetic oil (sample mass  $3.0 \pm 0.1$  mg) at 2 K/min in oxygen (100 ml/min) at defined pressures. With increasing oxygen pressure, oxidation starts earlier, i.e. at a lower temperature.



Precision of the Pressure Control: the pressure variations detected during the measurement ( $\pm 0.002$  MPa/ $\pm 0.02$  bar) are 100 times smaller than is prescribed by ASTM 6186, influences of the pressure on the DSC signal (e.g. noise) can therefore be minimized.



Partial area evaluation of the curing peak of two phenolic resin lots at a practical pressure of 9 MPa in an inert gas atmosphere at 10 K/min (sample mass 10.5 mg, heating rate 10 K/min).



Exothermal hydration of a metal catalyst at 7 MPa in a pure hydrogen atmosphere (sample mass 6.09 mg, heating rate 10 K/min).

# Highlights of the DSC 204 HP *Phoenix*<sup>®</sup>

The versatile high-pressure DSC 204 HP *Phoenix*<sup>®</sup> is part of our successful 200 series.

This also includes the heat flux Differential scanning calorimeter DSC 204 *F1 Phoenix*<sup>®</sup> and DSC 200 *F3 Maia*<sup>®</sup>, the Thermo-microbalances TG 209 *F1 Iris*<sup>®</sup> and TG 209 *F3 Tarsus*, the Thermomechanical analyzer TMA 202, the Dynamic mechanical analyzer DMA 242 C and the Dielectric analyzer series DEA 230/231 *Epsilon*.

The DSC 204 HP *Phoenix*<sup>®</sup> can also be operated simultaneously with high-temperature instruments of the 400 series in a multi-modulating mode.

- wide pressure range: vacuum ... 15 MPa (2176 psi)
- exact pressure adjustment (10 MPa ± 0.002 MPa)
- 1 bar: -150 °C to 600 °C  
50 bar: -90 °C to 600 °C  
150 bar: -50 °C to 450 °C  
dependent on the gas type
- heating rates: 0.01 K/min to 50 K/min
- measurements in different atmospheres
  - inert (N<sub>2</sub>, He, Ar)
  - reducing (H<sub>2</sub>)
  - oxidizing (O<sub>2</sub>, air)
- exact gas flow regulation (up to 500 ml/min)
- exchangeable sensor plate

## Accessories:

- electronic pressure controller
- electronic gas flow controller
- adapters for various gases
- vacuum pump
- CC 200 L for controlled cooling with liquid nitrogen
- calibration kit for temperature and sensitivity

Leading Thermal Analysis .

**NETZSCH**

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