

Capillary rheometer with Haul-off option

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Brand

Göttfert

Type

RG25



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Description

The RHEOGRAPH 25 is an innovative High Pressure Capillary Rheometer, according to DIN 54811, to determine the flow behaviour and viscosity of thermoplastic materials and rubbers. The RHEOGRAPH 25 is used in the field of research and development as well as for quality control and inspection of received goods. This rheometer is a 12 mm single bore that can be heated up to 400°C. It is provided with 5 different capillaries with different length/diameter ratios (L/D) and with three different transducers to measure pressure in different regions 0-100, 0-500 or 0-1400 bar. Its flexible settings allow to perform rheological measurements from aqueous solutions up to rubber compounds.

Technology

Rheometry techniques are crucial for obtaining information on the flow of materials at different conditions. For example, the development of new polymers and/or compounds requires knowledge on their flow properties. Melt flow index (MFI) is usually used in the plastic industry as a quick indication of the flow at a given set of conditions. Advanced rheometry for example by using the ARES gives fundamental information of the viscoelastic behaviour at low shear rates. A capillary rheometer is a complementary apparatus that works closer to the processing conditions, for example at high shear rates representative for injection moulding and extrusion conditions. Furthermore, insight in extensional viscosities, as measured with help of the Haul off accessory, are crucial for film, fibre and foam processing. Capillary rheometers give information about the shear and extensional forces needed to process a certain polymer or compound. Characterizing these forces is crucial for understanding the flow behaviour of polymers during processing. Measurements done with a capillary rheometer help identifying the range of applicability of a given polymer or compound.

When compared to other rheometry techniques like the dynamical rheometer, the capillary rheometer has the advantage that no sample preparation is needed. This means that 50 grams of extruded pellet materials (or even raw materials) will suffice for a measurement. In contrast, dynamic rheometry requires that compression moulded samples are prepared first, requiring more thermal handling of the materials. Furthermore, capillary rheometers are less susceptible to environmental disturbances, since the system is relatively closed and temperature can be controlled quite accurately. Also, capillary rheometers are easy to operate, with user friendly software which allows direct interpretation of the results.

Additional features

Counter pressure chamber

Some materials tend to foam or are unstable at the exit of the capillary, in order to have a stable measurement a counter pressure chamber can be installed. This pressure chamber is also used to evaluate pressure dependant viscosity.

Independent Haul-off system

The HAUL-OFF system is used to evaluate the melt strength of a given material. It consists of a measuring roll with a force transducer, a pull-off-wheel driven by a servomotor. During the measuring process, the melt strand is guided around the measuring roll towards the pull-off wheel. The pull-off force on the measuring roll is measured at a given take-off speed and acceleration of the pull-off-wheel. It can reach speeds up to 2000 m/min at forces up to 1N.

Technical Details

- Constant high piston force 25 kN
- Single barrel system: 12 mm design
- Five capillaries available with the following L/D: 0/1, 15/1, 30/1, 15/2, 30/2 Dynamic speed range 0.00004 mm/s to 40 mm/s (0.0024 mm/min. to 2400 mm/min.), this corresponds to a ratio of 1:1.000.000
- Integrated timer for automatic heat up
- Temperature range up to 400°C.
- Temperature control algorithm, resolution 0.01°C
- High dynamic piston acceleration: 0-40 mm/s in 0.6 s
- Position acquisition: high resolution encoder (0.0000016 mm)
- Rheological measurement range (depending on capillary and pressure transducer configuration): 10⁻⁴ to 10⁷ shear rate test range; 1 mPas to 10⁸ Pa.s realizable viscosity test range.
- Windows database software "LabRheo" for parameter setting and online monitoring via Ethernet, as well as free definable test evaluation with "WinRheo II"