

CAPILLARY RHEOMETERS RHEOGRAPH 25-120 - FOR MORE PRECISION AND WIDER RANGE OF APPLICATION

J. Sunder, A. Goettfert

Goettfert GmbH, Buchen, Germany

joachim.sunder@goettfert.de

In order to find the viscosity function over a wide range of shear rates, an exact pressure measurement is required. In the past measuring a broad range of shear rates it was necessary to exchange the pressure transducer in order to stay in their effective measurement range. The new development of the pressure transducer and data acquisition presented increases accuracy by more than one decade. Based on the example of polycarbonate a comparison of measurements between existing pressure transducers and our new developments are presented.

Based on the improved measurement possibilities rheological test results are discussed showing a wider range of application from capillary rheometer testing.

Beside rheological testing important thermal and thermodynamic data characterising the polymer like no flow temperature, pVT behaviour and thermal conductivity can be measured under process like conditions. Thermal conductivity can be determined in a fully automated mode in the temperature and pressure range 450°C and 1000bar. Further new developments were made for pVT measurement. The option is now available in fully automated operation in isobaric or isothermal mode according ISO17744. Measurement examples and comparison data to Gnomix dilatometer are presented.

Flow instabilities cause various problems in extrusion blow- or flat film processes. Especially shark skin is affected by molecular structure. This phenomenon is analyzed in various scientific works using apparatus that are complex or difficult in operation.

A new set-up, now available is being presented as an option for new and existing capillary rheometers or lab extruders, consisting of a special designed die, a fast responsive transducers system and evaluation software. The software allows the evaluation of diverse pressure frequency regimes causing flow instabilities and generate statistics. Measurement examples are given for different shear rates and polymers. The shark skin effect can be detected even before it is visible on the extrudate. The measured frequency regimes are related to molecular parameters.