

Thermal Expansion—Dilatometer

L76 Series

Thermo analytical methods are extensively used in all fields of materials characterization. Particularly in the areas of ceramics and glasses, thermal methods such as pushrod dilatometry yield vital information for the production of the materials and for their later application.

Dilatometry is a technique at which a dimensional change of a substance is measured as a function of temperature while the substance is subjected to a controlled temperature program.

Many international norms such as DIN 51045, ASTM E 831, ASTM D 696 and ASTM D 3386 describe this technique and the exact procedures in detail.

The specific materials properties gathered from this are as follows:

- Linear thermal expansion (dL)
- Sinter-temperatures and sinter-steps
- Determination of glass transition (T_g)
- Phase changes
- Optimization of burning processes
- Determination of thermal expansion coefficient (CTE)
- Influence of additives
- Volume changes
- Rate controlled sintering (RCS)



The newly developed DIL L76 Platinum Series is especially tailored to the needs of the glass and ceramic industries. High resolution and stability, wide measurement range, robust and compact design are only some of the advantages of the new, cost-effective system.

The system can be equipped with three furnaces, allowing measurements to be carried out from room temperature up to 1000°C / 1400°C or even up to 1600°C.

Technical Specifications

Furnaces (exchangeable): RT ... 1000°C,
RT ... 1400°C
RT ... 1600°C

Heating/Cooling rates: 0 ... 50 K/min

Sample holders: Fused Silica (max. 1100°C),
Alumina (max. 1600°C)

(user exchangeable)

Sample thermocouple: type S (Pt/Pt10%Rh)

Resolution: 1.25 nm/digit

Sample diameter: 1 ... 7/14/20 mm

Sample length: 0 ... 25/50 mm

Atmospheres: oxid. (static, dynamic), inert

Electronics: integrated

PC Interface: USB

Accessories

WCU "Water Cooling Unit" for temperature stabilization of the dilatometer measuring system, independent of external water connection. Various vacuum pumps, including turbomolecular pumps for creation of the purest gas atmospheres or for dilatometer measurements under vacuum. Heated adapter for coupling via heated quartz glass capillary. Selection of sample holders of different designs and materials and for various sample sizes Protective sleeves for sample thermocouples Sample supports for various diameters Sample preparation machines Vernier callipers for online input of the sample length..

Software

All thermo analytical devices of LINSEIS are PC controlled, the individual software modules exclusively run under Microsoft® Windows® operating systems. The complete software consists of 3 modules: temperature control, data acquisition and data evaluation. The Linseis 32 — bit software encounters all essential features for measurement preparation, execution and evaluation with a Dilatometer run, just like with other thermo analytical experiments. Due to our specialists and application experts LINSEIS was able to develop this easy understandable and highly practical software.

Features -Software

- Program capable of text editing
- Data security in case of power failure
- Thermocouple break protection
- Repetition measurements with minimum parameter

Input

- Evaluation of current measurement
- Curve comparison up to 32 curves
- Storage and export of evaluations
- Export and import of data ASCII
- Data export to MS Excel
- Multi-methods analysis (DSC TG, TMA, DIL, etc.)
- Zoom function
- 1 and 2 derivation
- Programmable gas control
- Statistical evaluation package
- Free scaling

DIL Features

- Sinter process evaluation
- Glass transition and softening point evaluation
- Softening point determination + system shut down
- Linear thermal expansion evaluation
- Several system correction features
- Automatic zero point adjustment
- Auto-scheduler for up to 16 runs

Optional Software

- Rate Controlled Sintering (RCS) software
- L-DTA analysis: characterization of energetic effects simultaneous to the dilatometer results (calculated DTA)
- Thermokinetics: advanced characterization and optimization of sintering reactions.



Quartz measuring system for large samples, 20mm dia,



Quartz measuring system, 7—12mm diameter.



Al₂O₃ measuring system, standard.



Al₂O₃ measuring system, contact free



Adapter for powders and pastes.