Laboratory of Technical Measurement and Thermophysical Properties of Materials

Principal goals and activities

- Measuring of state parameters (pressure, temperature, density).
- Measuring of relative humidity and dewpoint.
- Measurement of flow velocity and mass flow.
- Measurement of heating capacity in gas, liquid and solid fuels, heat conductivity.
- Measurement of viscosity and density of fluids.
- Calibration of pressure and temperature sensors.

General focus of laboratory

The Laboratory of Thermophysical Properties of Materials is a modern, world-class equipped site that provides background for experimental work of Czech and international students of Technical University in Liberec as well as research and experimental work to serve the needs of the industry. Instruments of the site include HI-TEC instruments for measurement of viscosity and density of fluids, coefficients in heat conductivity in solid, liquid and loose materials, combustion and reaction heat.
The laboratory also includes the LabView software environment which is used for the recording and evaluating the experiment data.

Specific instruments and outcomes

- JofraITC-650 calibration furnace with temperature range 33 – 650° C, with an accuracy of ±0.1° C.
- AmetekRK-8B pneumatic load calibrator using the „Floatingball" principle with an accuracy of 0.015 %.

IKA C 6000 calorimeter
Highly automated, next-generation calorimeter. The instrument is used to determine the heat capacity of solid materials, to determine combustion and reaction heat and heating power of liquid and solid fuels. The instrument is unique in offering calorimetric measurement in all three modes: adiabatic, isothermal and dynamic. The IKA C 6000 excels in high accuracy (minimum temperature resolution 0.0001 K), high speed of measurement (8–16 min) and high range of measurement (40 kJ).

C-Therm TCi heat conductivity analyzer
The unique instrument offers very precise determination of heat conductivity in a wide range (0 ÷ 120) W/(m.K), in extremely short times (0.8 ÷ 5) s and in a wide range of temperatures (-50 ÷ 200) °C. It is the only instrument that offers determination of heat conductivity in solids, liquids, pastes and dust using a single sensor.

Sine-wave Vibro Viscometer SV-10 vibration viscosity analyser
The instrument is used to measure viscosity of fluids and for determination of heat dependence of viscosity. The new method offers high accuracy, speed and a wide range of measurement (0.3 ÷ 10,000) mPa.s, which is taken in real time.
The instrument offers measurement of viscosity in a wide range of temperatures in Newtonian and non-Newtonian fluids, foam and foamed samples, and multi-phase mixtures.

Lambda HFM 436/1E for measurement of heat conductivity coefficient
Made by NETZSCH GmbH, this instrument measures heat conductivity coefficient of insulation materials in the range (0.005 ÷ 0.5) W/(m.K) and temperature range (-30 ÷ +90)° C. The measurement identifies the rate of heat flow passing through the insulation material sample at a defined temperature gradient, which offers the measurement to be taken in loose and fibrous materials.

Densito 30P density analyser
A manual, digital density analyser with temperature compensation allows measuring the density, or concentration, of the sample within seconds. The density analyser uses the principle of an oscillating, hollow glass tube. The instrument is suitable for operating measurement too.