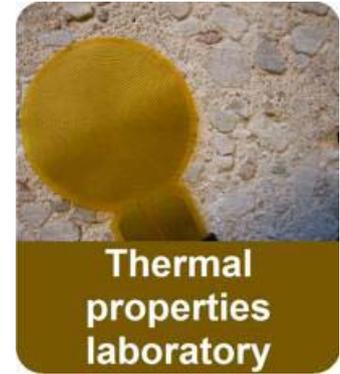


# Laboratories at Building Materials, Lund University, Sweden



## Thermal properties laboratory

Building Materials at Lund University has for many years been specialists in material properties related to water and water vapor, for example diffusion coefficient and sorption isotherms. We have during the last five years complemented this with a thermal properties laboratory, as both thermal and water related properties are needed by for example the construction industry and the pharmaceutical industry.

Our thermal property laboratory consists of two parts: measurements of thermal conductivity and volumetric heat capacity with a HotDisk instrument, and measurements of more complex thermal properties by calorimetric techniques.

### Hot Disk instrument

We have a HotDisk 1500 from Hot Disk AB ([www.hotdiskinstruments.com](http://www.hotdiskinstruments.com)) that simultaneously measures thermal conductivity and volumetric heat capacity of solid samples. The patented technique is unique in its versatility; a combined heater and temperature sensor is placed in contact with a material and the temperature change of the sensor following a heating period is monitored. Because of the unique shape of the sensor, it is possible to calculate both the thermal conductivity and the volumetric heat capacity (and thus the thermal diffusivity) the temperature change.



The sample has to have a plane surface, a thickness that is not smaller than the diameter of the sensor, and the sensor should be much larger than the largest components (phases). We have sensors with diameters between 13 and 49 mm.

We have used the instrument on different types of materials with good results, for example in a study of the thermal properties of concrete. The only limitation is that we cannot measure on smaller objects than about 20 mm x 20 mm x 12 mm.

### Measurements of complex thermal properties

With our equipment in our isothermal calorimetry laboratory (Lund Isothermal Calorimetry Group) we can measure such thermal properties as:

- Enthalpies of condensation/vaporization
- Enthalpies of solidification/melting
- Enthalpies of crystallization and other phase changes
- Specific heat capacities

Such measurements are tailored to the specific needs of our projects or customers.

One example of this type of measurement was the determination of the enthalpy of crystallization of aqueous solutions of sodium acetate that are used in for example rechargeable hand-warmers (Arnesson et al. 2011).

### Reference

Arnesson, T., Haglund, J. and Nielsen, D. (2011) "Seasonal storage of thermal energy in supercooled sodium acetate" (in Swedish), Master thesis, TVBM-5081, Building Materials, Lund University

### Contact

Contact Lars Wadsö (see left) or Bengt Nilsson (Tel: 046-2224494, [Bengt.Nilsson@byggtek.lth.se](mailto:Bengt.Nilsson@byggtek.lth.se)).

