

Material characterisation capabilities

material characterisation laboratory, engineering and consultancy services

Hukseflux is a technology-driven company with a clear core purpose: to take measurement to the next level. At Hukseflux we have expertise in design of experiments and equipment for material characterisation to measure thermal properties, total thermal resistance and contact resistances. Do you have any questions about our products and services or would you like a suggestion on how to set up an experiment, don't hesitate to contact us.

Introduction

Hukseflux is a leading manufacturer of heat flux sensors, radiometers and a range of thermal conductivity measuring systems. Products made by Hukseflux for material characterisation play a vital role in various applications. Did you know that Hukseflux offers testing, engineering and consultancy services as well?

What we do

- sell our “standard” **product range** of sensors and systems for material characterisation, mainly aimed at plastics, composites and soils. See the **thermal conductivity measurement selection guide**
- perform “standard” **measurements** in our material characterisation laboratory on specimens supplied by customers. Common materials are plastics, paints, composites, pastes, powders, fluids, foodstuff and insulation materials. Please ask for our **specimen requirements** and fill in our **request form**
- design customer-specific experiments together with our customers to analyse material- or equipment properties and thermal contact resistances, as part of our engineering and consultancy services
- serve as consultant for designing sensors
- provide **expert training** in system use, in particular for thermal analyses of soils, thermal route surveys and for measurements of building envelope thermal resistance
- rent out systems, including support for analysing data.

Highlighted in this brochure are our material characterisation laboratory, custom-made instrument design and customer-specific experiments.



Figure 1 Common material types are plastics, soils, paints, composites, pastes, powders, fluids and foodstuff



Figure 2 Performing measurements for customers in Hukseflux material characterisation laboratory: using calibration reference cylinders for traceability

Use our laboratory facilities

The Hukseflux material characterisation laboratory is well equipped and staffed. Table 1 provides an overview of the main facilities to measure thermal properties.

Table 1 Hukseflux material characterisation laboratory: facilities and applicable standards

HUKSEFLUX MATERIAL CHARACTERISATION LABORATORY: FACILITIES		
Facility	Purpose	Application
Thin heater apparatus ASTM C1114	Measurement of thermal conductivity and total thermal resistance Estimate of heat capacity	Plastics, composites, paints, cloth, fabric
Thin heater apparatus ASTM C1114	Measurement of thermal contact resistance	Plastics, composites, paints
Modified thin heater apparatus	Measurement of thermal conductivity in the in-plane direction	Metal foils, bi-directional measurement of composites and anisotropic materials
Guarded hot plate ISO 8302, DIN 52612, DIN EN 1946-2, EN 12664, EN 12667, EN 12939	Measurement of thermal conductivity and total thermal resistance	Insulation materials
Thermal needle systems ASTM D 5334-92, IEEE 442-1981	Measurement of thermal conductivity and thermal resistivity	Granulates, powders, soils, pastes and viscous fluids On-site soil testing
Heat flux sensors and differential temperature sensors ISO 9869, ASTM C1155 / C1046	Building envelope thermal analysis H-values and U-values of walls	On-site measurement of total thermal resistance of walls
Reference materials	Offer traceability to international standards	Insulation materials and plastic transferred to glass, fluids and metal
Thermal camera	Infrared temperature measurement	Visual verification of experimental results
Thermal simulation software (Solidworks Flow Simulation)	CFD simulation of experiments	Validation of experiments
Climate chamber / Oven	High and low temperature environment	High and low temperature experiments

References

Some of our references:



Contact Hukseflux

We are able to offer creative solutions as well as highest quality products at an acceptable price level. If we cannot offer you an acceptable solution ourselves, we will tell you who can. Please **contact** us to discuss if the material characterisation laboratory can offer a solution for your needs or ask for the **request form**.

Design of customer-specific experiments and custom-made instruments

At Hukseflux we have years of experience performing measurements and designing experiments. We have many custom-made sensors (for heat flux and differential temperature) and measuring systems that make it possible to quickly and efficiently perform our first prototyping.

- we “recycle” our expertise in different applications
- we have special sensors on stock: efficient and quick during the first design phase

Take a look at some examples of our engineering and consultancy services in Tables 2 and 3:

Table 2 *Examples of custom-made instruments designed by Hukseflux*

HUKSEFLUX ENGINEERING AND CONSULTANCY : CUSTOM-MADE INSTRUMENTS		
	Plastics with nanoparticles	Semiconductor
Application	Measurement of thermal properties of plastic melts with nanoparticles	Measurement of contact resistance of interface layers in the 10 to 50 x 10 ⁻³ m thickness range
Advantages	Working at high pressures and temperatures in extrusion environment	Specially developed measurement principle eliminating the effect of contact resistance
Comment	Funded by European Union, FP7 NanoOnSpect project	

Table 3 *Examples of customer-specific experiments designed for Hukseflux' customers*

HUKSEFLUX ENGINEERING AND CONSULTANCY: CUSTOMER-SPECIFIC EXPERIMENTS			
Subject	Paint characterisation	Ultra strong synthetic fibre characterisation	LNG transport tube characterisation
Purpose	Comparison of high thermal conductivity paints	Estimating the through-fibre thermal conductivity of aramide fibres	Measurement of tube thermal insulation for Liquefied Natural Gas (LNG) transport
Experiment setup	Stacking samples, elimination of contact resistance, comparison to literature values	Preparation of samples, casting fibres into epoxy	Test rig at partner institute, TNO , working at -160 °C



Figure 3 *Using our guarded hot plate for testing in Hukseflux material characterisation laboratory*

About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. We design and supply sensors as well as test & measuring systems, and offer related services such as engineering and consultancy. With our laboratory facilities, we provide testing services including material characterisation and calibration. Our main area of expertise is measurement thermal quantities such as solar radiation, heat flux and thermal conductivity. Hukseflux is ISO 9001:2008 certified. Hukseflux sensors, systems and services are offered worldwide via our office in Delft, the Netherlands and local distributors.

Would you like more information?
E-mail us at: info@hukseflux.com