

## Measuring and Testing in the Department Insulation Products for Buildings:

- **Initial Type Tests** according to EN 13162 – EN 13171
- **Tests** for the technical approval of new insulating material according to the test programme of the DIBt or European Technical Approval Guidelines (ETAG)
- **Measurement and testing of thermal conductivity of construction or insulating products** according to the testing regulations in the standards DIN EN 12664, DIN EN 12667, DIN EN 12939, ISO 8301, ISO 8302, ASTM C-177 and guidelines of the DIBt, Berlin, Germany
  - in a temperature range of -30°C to +80°C mean temperature
  - at 10 °C mean temperature
- **Testing of class DIN 4102-B2 and determining the reaction to fire according to DIN EN ISO 11925-2**
- **Measurement and testing of mechanical properties**
  - Rectangularity, flatness, dimensions, thickness, apparent density
  - Thickness under load (insulating material under floating floor according to DIN EN 12431)
  - Tensile strength, compression strength, compression stress
  - Deformation under specified pressure and temperature conditions according to DIN EN 1605
  - Compression test according to DIN EN 826
  - Shear stress according to DIN EN 12090
  - Flexural strength according to DIN EN 12089
  - Point load according to DIN EN 12430
  - Dynamic stiffness according to DIN EN 29052-1
  - Expansion and contraction coefficient according to DIN EN 13471
- Settling after conditioning
- Settling after climatic storage at 40 °C/90 % relative humidity
- Long-term compression behaviour, long-term creep test according to DIN EN 1606 to a thickness of 300 mm maximum.
- Pull-through resistance of mechanical fixings
- **Measurement and testing of hygric properties and behaviour under frost**
  - Water absorption according to DIN 12087
  - Temperature change 20 °C/40 °C
  - Diffusion test 50/1 °C according to DIN EN 12088
  - Frost-thaw test and compression test according to DIN EN 12091
  - Equilibrium humidity according to DIN EN 12429
  - Absorption humidity of building material according to DIN EN ISO 12571 (DIN 52 620)
  - Water absorption under partial immersion according to DIN EN 1609
  - Humidity content according to DIN EN 322
- **Measurement and testing of dimensional stability**
  - Dimensional stability according to DIN EN 1603
  - Dimensional stability under specified temperature and humidity conditions according to DIN EN 1604
- **Measurement and testing of other properties**
  - Closed cell content according to ISO 4590
  - Cell-gas composition
  - Content of chloride in wood wool lightweight boards according to DIN EN 13168
  - Flow resistance specific to length according to DIN EN 29053

## Measuring and Testing in the Department Industrial Insulation

- **Measurement and testing of thermal conductivity of construction and thermal insulating products** according to the testing regulations of DIN EN 12664, DIN EN 12667, ISO 8301, ISO 8302, ASTM C-177 and the guidelines of the DIBt, Berlin

  - at a temperature range of -180 °C to 900 °C
  - at 10 °C mean temperature
  - at 40 °C mean temperature
  
- **Measurement and testing of thermal conductivity of insulating material for pipes, pipe insulations and pipe systems** according to the testing regulations of DIN 52613 and DIN EN ISO 8497

  - at the range of -70 °C to +300 °C mean temperature
  - at 10 °C mean temperature for cooling insulation
  - at 40 °C mean temperature for insulation material for heating system
  - at 50 °C mean temperature for district heating pipes
  
- **Measurement and testing of dimensional stability**

  - Dimensional stability according to DIN EN 1603
  - Dimensional stability at defined temperature and humidity conditions according to DIN EN 1604
  
- **Determination of behaviour at higher temperatures (ISO 8142)**

  - Application category temperature according to DIN EN 14706 und DIN EN 14707
  - Application temperature for practical constructional systems with or without oscillation
  
- **Measurement of the thermal transfer and of the temperature field on**

  - Insulation systems
  - Construction parts in standardised and special measurement and testing installations
  
- **Testing in the requested field of fire control/ fire behaviour of building material**

  - Non combustibility according to DIN EN ISO 1182
  - Combustion heat according to DIN EN ISO 1716
  - Inflammability when directly exposed to flames according to DIN EN ISO 11925-2
  
- **Measurement and testing of mechanical properties**

  - Condition, dimensions and apparent density according to DIN EN 1602 und DIN EN 13470
  - Tensile strength according to DIN EN 1607, tear initiation resistance, traverse tensile strength
  - Deformation under specified pressure and temperature conditions according to DIN EN 1605
  - Compression test according to DIN EN 826
  - Shear resistance according to DIN EN 12090
  - Flexural strength according to DIN EN 12089, point load according to DIN EN 12430
  - Expansion and contraction coefficient according to DIN EN 13471
  - Long-term compression behaviour, long-term creep test according to DIN EN 1606

## ■ Measurement and testing of hygric properties and behaviour in frost

- Water absorption according to DIN EN 12087
- Temperature change 20/40 °C
- Diffusion test 50/1 °C according to DIN EN 12088
- Water absorption under partial immersion according to DIN EN 1609
- Humidity content according to DIN EN 322

## ■ Measurement and testing of water vapour permeability according to DIN EN 13469 and DIN EN ISO 12572

## ■ Measurement and testing of other properties

- Closed cell content according to ISO 4590
- Cell-gas composition
- Content of water soluble chloride ions according to DIN EN 13468
- Thermal stability
- Flow resistance specific to length according to DIN EN 29053
- Non-fibrous components (beads)
- Ignition loss according to DIN EN 13820
- Fibre diameter
- Determination of the total lack of silicone in thermal insulating material

## ■ Acceptance inspection

Measurements of operational equipment on scene with the help of heat flow measure and/or infra red camera



## Building Physics and Building Components

The department of building physics and building components offers a multitude of examinations and testing regarding the thermal and humidity performance of building components and energy saving. We support our clients when developing and optimising insulation and construction material as well as building components and insulation structures.

In the frame of the FIW's approval as an accredited testing, surveillance and certification body (in German PÜZ-Stelle), the department of building physics and building components covers the followings areas:

- Characteristics for thermal and moisture performance
- Masonry blocks
- Windows and window profiles
- Under roofing membranes
- Adhesive tapes and adhesive compounds
- Polyurethane (PUR) in-situ foam for roof and wall insulation
- Urea-formaldehyde (UF) in-situ foam for thermal insulation of cavity walls and roofs

Our clients can rely on high quality testing equipment and the latest testing methods like test facilities for e.g. facades and building components, the degree of infra-red emission, thermograph, thermal transmittance, thermal capacity, as well as the latest analytical methods.

The testing and evaluation of new building products and components is an important field of activity of the department of building physics and building components. This is done more and more by calculation and simulation by means of up-to-date computer programs. However, the reliance on such calculation can often only be ensured in additional tests by measurements of the thermal insulation characteristics. Mainly, in the case of new thermal insulation materials and new building products like vacuum insulation panels (VIP), reflective foil insulation for roofs or new masonry blocks filled with insulation material there are often no or only limited reliable material data one can take as a basis for the calculation. Such specific values are established for the producers, administration and the building authority in the frame of testing for technical approval or product identification.

Mechanical characteristics, the ageing and fire behaviour, the resistance against water transition and the water vapour permeability are tested as to the CE marking of under roofing membranes or sarking membranes and to the DIN Certco seal of quality.

# Testing at FIW München

FIW P.12-App.1

## Measurement and testing services of the department of building physics and building components:

### ■ Building constructions and insulating constructions

### ■ Roofs, facades and light-weight building constructions

### ■ Masonry blocks, walls and solid building materials

### ■ Plastic anchors for external thermal insulation composite systems (ETICS)

### ■ Windows, window frames, glazings and mounting parts

- Determination of thermal transmittance, heat transfer and temperature distribution with specially adapted standardized or individually designed testing devices
- Calculation of thermal transmittance, heat transfer and temperature distribution with finite difference and finite element programs
- Examination of the formation of surface and interstitial condensation by calculation and measuring technique

- Calculation of the thermal and moisture behaviour in transient and steady-state, thermohygric long-term behaviour
- Measuring of the transport and accumulation of moisture in constructions
- Calculation of thermal bridges and thermal bridges catalogues
- Examination of the air tightness of building components and foils
- Additional characterisation with infrared cameras
- Water vapour transport
- Guarded hot-plate measurement on half-bricks

### ■ Insulation material, building materials, loose fills, insulation fills, insulation hoses, insulation bushings, in-situ foams, diffusion tight bushings and packaging, plastic pipes, any products:

- Water vapour transmission properties,  $\mu$  value
- Diffusion test
- Compensating moisture content, hygroscopic sorption properties
- Settling of loose-fill insulation material
- Determination of grading curves according to DIN 4226-3

■ **In-situ foams in the construction sector  
(PUR spray-on foam, PUR roof spray-on  
foam, UF in-situ foams):**

- Testing of all relevant characteristics of the insulation material (apparent density, compressive strength, form and dimensional stability, water absorption, compensating humidity, diffusion resistance, thermal stability, thermal conductivity, ageing of the thermal conductivity, cellular gases, cellular diameter, fire behaviour) in view of the technical approval for new products and of the continuous third party surveillance of producers and processors
- Execution of the third party surveillance and testing of the own surveillance of the producers of systems and processors
- expert opinion and statements

■ **Buildings:**

- Calculation of the thermal comfort in summer (dynamic thermal simulation of building)
- Calculation of the energy requirement in summer and in winter by means of steady (proof method) or transient methods, energy certificate
- Parallel scientific research and quality assurance in view of energetic modernisation and energy efficiency in buildings
- Recording and evaluation of the actual energy consumption in refurbished buildings in form of an efficiency control
- Thermal bridges
- Characterising defects by infrared camera
- On-site measurement of the thermal transmission of walls
- Expert opinions, statements and survey reports concerning building physical damages and the used material

# Testing at FIW München



## ■ Underlays for discontinuous roofing and walls to DIN EN 13859-1 and -2 (out of plastics, elastomeric or bitumen) and plastic and rubber vapour control layers according to DIN EN 13984:

- Tensile properties
- Resistance to tearing (nail shank)
- Flexibility at low temperature
- Length, width, straightness and flatness
- Thickness and mass per area
- Dimensional stability
- Water vapour transmission properties
- Frost-thaw change
- Water tightness
- Resistance against water penetration
- Method of artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water
- Method for artificial ageing by long term exposure to elevated temperature
- Water tightness under the influence of surfactants
- Resistance against water penetration
- Reaction to fire
- Shear resistance of joints
- Visible defects
- Resistance to impact
- Durability after artificial ageing
- Durability to alkaline materials
- Resistant to deformation under load

## ■ Trainings, seminars and lectures

# Testing at FIW München



## New Measuring and Testing Services

### Measuring of emissions

Determination of the emission of volatile organic compounds (VOC) and evaluation according to the AgBB scheme

- Determination of the emission: sampling, storage and preparation according to DIN EN ISO 16000-11:2006-06
- Determination of the emission according to the test chamber method (20 litres chamber) of DIN EN ISO 16000-9:2006-06
- Determination of the emission according to the test cell method in DIN EN ISO 16000-10:2006-06

- Determination of VOC on TENAX TA, thermal desorption and GC/MS analysis according to DIN ISO 16000-6:2002-09

- Determination of the carbonyl compounds and formaldehyde according to DIN ISO 16000-3:2002-08
- Evaluation according to the principles of approval concerning the health assessment of building products used indoors issued by the German authority (DIBt).