FIW München

Forschungsinstitut für Wärmeschutz e.V. München

Annual report 2019

FIW München

Forschungsinstitut für Wärmeschutz e.V. München

Table of contents

1 Editorial

The heat revolution is coming, but quality remains the top priority.

The year 2019 was underpinned by the call for increased action on climate change and the support thereof through the implementation of concrete, intelligent and socially sustainable measures. A trend which is here to stay and will continue long into the future.

At its core, **thermal insulation**, as the founders of the institute wanted it to be understood and as reiterated by speakers from the federal and state governments at the the 100-year anniversary celebration in the Senate Hall of the Bavarian Parliament, **is climate protection**.

“High economic costs are an unavoidable byproduct of unabated climate change; the costs of prevention are significantly lower”, Prof. Dr. Ottmar Edenhofer proclaimed at the anniversary event.

The effects of climate change are becoming increasingly undisputable in Germany and around the globe. Movements and demonstrations calling for political action are similarly not going unnoticed.
For months, “Fridays for Future” placed governments under mounting political pressure to act. The dissonance created by the protesting students also caught the attention of large swathes of the population, leading to a national discussion and call for political action.

The German government has acted accordingly and established a cabinet committee dedicated to climate protection. This paved the way for the legal implementation of the climate protection targets for 2030.

With our support, the Federal Ministry of the Interior and the Federal Ministry for Economic Affairs and Energy have devised proposals for a corresponding

package of measures and submitted them to the climate cabinet.
The German government has set itself the target of making all existing German building stock climate-neutral.
As of 2030, buildings in Germany are only permitted to emit a maximum of 70 to 72 million tonnes of CO_2. This looming deadline means we all need to start implementing measures as soon as possible to almost halve CO_2 emissions in buildings by 2010.

This sector target constitutes a key component of the German government's climate package to secure the future. We view this responsibility as not only a current and ongoing obligation, but a challenge for us to fulfil the mission statement of our institute, which was established not just to contribute but also actively participate in the political decision-making process with scientific expertise and responsibility whilst simultaneously supporting implementation measures.

Qualitative prerequisites form the basis for ensuring that the climate protection targets in the German government's future-oriented climate package, especially in the construction sector, can be achieved through thermal insulation measures.

For us, this is not only an obligation arising from our mission statement, but also from the associated intergenerational and generation-securing necessity; a fundamental challenge in terms of civilization. This obligation will not simply disappear as a result of the COVID-19 crisis, but will remain of the utmost national and international importance as the fundamental driver behind ecological and social sustainability. The implementation and strengthening of climate protection measures is of critical priority. They need to form an integral part of economic stimulus packages and be closely aligned with the European "Green Deal".

Governments will increasingly be required to take bold measures to ensure the sustainability of the climate and future-orientated public welfare, similar to those introduced during the current COVID-19 crisis. Our obligation to protect the climate remains even against the backdrop of the great concerns surrounding the current situation and the deep impact it will remain to have for years to come. In order to avoid an equally devastating climate crisis, sustainability criteria need to be further intensified in addition to the regulatory and funding policy measures that have already been introduced to ensure a long-term commitment. Strong preferences also need to once more be shown for certain technologies as they were the energy revolution, for example.

Sustainability needs to be at the core of measures introduced by the government to kickstart the economy once the pandemic has subsided. Climate and environmental protection offers enormous potential for economic development and the further development of a climate-friendly economy, which needs to be tapped into.

Thermal insulation is climate protection, which is why this task is and remains an important prerequisite for our future activities. The employees, members and management of the institute are and will remain highly committed to it.

Klaus-W. Körner
Chairman of the Board
FIW München

Prof. Dr.-Ing. Andreas Holm
Managing Director
Head of the Institute

2 FIW München at a glance

At FIW München, we have instilled a proactive attitude, approaching the challenges posed by the energy and heat revolution with sound judgement and attempting to bridge the gap between human ambition and feasible actions. This is how we aim to transform our visions into concrete actions.

The infrastructural prerequisites for long-term growth in the attractive working hub of Munich have been secured with the acquisition of the adjoining site “Am Kirchenhölzl 5”. Future developments on the site were funded by financial resources gained from the once again positive net income for the year. The conversion and dismantling of the existing premises created space for new measurement setups and research fields. Two additional fire tests (non-combustibility according to DIN EN ISO 1182, the determination of the gross heat of combustion according to DIN EN ISO 1716) were added to the institutes repertoire in addition to test beds and test stations for further standard tests and high-capacity analytical laboratories to determine basic material properties in the field of research. FIW München also produced simulation models to generate precise results and help optimise the thermal conductivity and moisture content of insulation and construction materials as well as building components and insulation structures.

Continuous and sustainable personnel, organisational and competence development within the institute are not simply eye-catching keywords in FIW’s QM manual: They are pursued, reflected on and adjusted when required in daily engagements and strategy meetings. Daily life at the institute is underpinned by the continuous development of internal resources and the step-by-step introduction of future important tasks, from emerging laboratory technicians in training to potential department heads.

2019 also proved to be a productive year with regard to reporting, certification and testing, with the establishment of the foundations for a new, voluntary quality mark: The Q mark is a registered certification mark with a well-established set of rules (certification system) that will replace the surveillance mark which has been discontinued as a result of European harmonisation efforts. In accordance with the rules established by FIW München, factory audits and extensive product tests are carried out on the insulation materials by FIW München and accredited partners. The Q mark is awarded if these tests are passed. This provides consumers and planners on the German market with a level of confidence in the product that was lost with the discontinuation of the Ü mark.

We also take our mission statement very seriously and try to incorporate the scientific findings we obtain, such as those on the reasonable ecological and economic allocation of resources in the construction sector, in the convergence between academia and practice. We will also contribute our knowledge and commitment to the drafting of the Building Energy Act.

In addition to these unique opportunities to make the right strategic decisions for the future, we also help to shape standards and regulations at a national and European level as a member of over 80 bodies and committees. Moreover, we share our findings at symposia, workshops and specialist conferences parallel to our day-to-day activities.

The structure of FIW München

As a key driver of innovation, FIW München has taken a leading role in the new and further development of methods in the field of energy efficiency for buildings and industrial applications. The directly charitable purpose of the registered association is centered on the development of new technologies, procedures, applications and services. This aim laid down in the statute is achieved by the following in particular:

- Research into the laws on heat and material transfers, in particular the scientific principles of thermal insulation.
- Disseminating this knowledge
- Thermotechnical testing of construction and thermal insulation materials and the constructions made from them
- Cooperation with heat conservation associations, technical associations and scientific institutes

Director of the institute:

Prof. Dr.-Ing. Andreas H. Holm

Research and development of thermal insulation
Christoph Sprengard

Services

Quality management
Ralph Alberti

Equipment building and management
Christopher Fiegel

Certification body
Wolfgang Albrecht

Insulation materials in the construction industry
Claus Karrer

Technical insulation
Roland Schreiner

A change has occurred within the testing and surveillance body at FIW München in accordance with the State Building Code (Landesbauordnung, LBO).
Stephan Guess is the new head of the testing body, with Stefan Kutschera assuming leadership of the surveillance body.
Claus Karrer, the previous head of the testing and surveillance body will continue to provide customers with additional support and information when they switch to voluntary certification schemes.
The previous deputy Roland Schreiner will remain in his role and continue to provide continuity in the testing and surveillance body pursuant to the LBO.

The (management) employees of the certification, surveillance and testing body are professionally exempt from the requirement to comply with instructions issued by the institute's management within the scope of their activities according to the State Building Code and the EU Construction Products Regulation.

Core competencies and business areas

The structure and organisation of FIW München is based on both the business areas and the classical core competencies. These comprise, amongst other things, laboratory testing, open-air testing, the development of measurement equipment, in-situ demonstrations, studies, further education and standardisation.

Testing, surveillance, certification	Research and development	Transfer of knowledge and technology
Comprehensive assessment of the building envelope	Principles of thermal insulation, moisture protection and construction chemistry	National and international standards
In all aspects of	Testing of technologies and new materials to improve energy efficiency	Member of various expert committees
thermal insulation	Impact of influencing variables	Publications and presentations
moisture protection	Durability of materials and systems	Completion of training courses and symposia
fire protection	Initial research into construction materials and the development of construction systems	Development of measurement and testing equipment
stability	Energetic optimisation of the entire construction system	
material composition		
Development of testing standards, material standards, guidelines and worksheets		

Construction industry

Insulation of technical installations and industrial constructions

Transport and logistics

Financial and personnel development

FIW München generated earnings of EUR 8.28 million (7.96 million in the previous year) in the 2019 financial year. The R&D segment contributed over EUR 1 million to the positive result achieved by the institute in 2019. Turnover for voluntary surveillance systems increased as a result of growing awareness among manufacturers and (end) consumers regarding the quality assurance of high-quality products. The testing and surveillance and research and development segments have undergone adjustments to facilitate the increasing product diversity of the insulation materials and insulation systems requiring testing. Capital expenditure on plant and equipment fell slightly below the previous year's level, as a number of projects were delayed beyond 2019 due to capacity constraints. One exception to this was the acquisition of the adjoining property Am Kirchenhölzl 5, including its storage facilities, which provides FIW München with long-term expansion options at its current location.

After adjustments to facilitate the new order situation, the number of employees in 2019 remained comparable to the previous year. At the end of December 2019, 70 employees (previous year 69) were working on the institute's premises, which corresponds to a full-time equivalent of 64 (previous year 64).

FIW München offers its employees long-term employment and development opportunities. The success of these measures is reflected by the general satisfaction at the institute and the high employee retention rate. The high level of employee loyalty and preservation of skills and experience contribute significantly to the success of the institute and further confirm the high approval of the employer and high standards in place.

The following employees celebrated work anniversaries with us in the 2019 financial year:

Work anniversaries

10 year anniversaries
Günther Bartonek
Alexander Gurewitsch

15 year anniversaries
Thomas Winterling

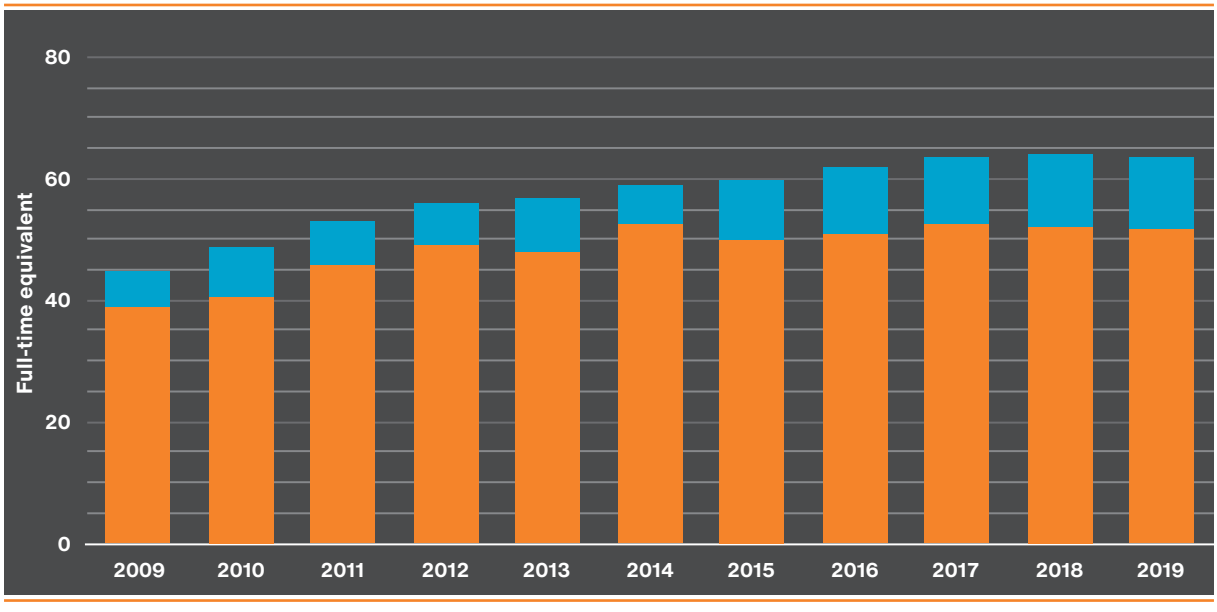
20 year anniversaries
Martin Mayer

25 year anniversaries
Wolfgang Moosburger
Annett Stratz

30 year anniversaries
Andrea Bergler
Roland Kümmel

35 year anniversaries
Rolf Opp

Employee development



3 Boards and committees

Networks, cooperations and committees

The success and quality of projects hinges on contributions from a large network and innovative partners. FIW München is therefore integrated into a network of national and international cooperations and is a member of several associations.

It also strives to accelerate and take an active role in shaping required changes in the field of standardisation to ensure that results are scientifically substantiated but nevertheless remain practically orientated and implementable. This work often leads to high expenditures and typically constitutes a long-term commitment. Despite certain difficulties relating to financing, FIW München remains committed to its goal to continue to actively support standardisation work in the areas key to its customers.

Memberships of FIW München

- Advanced Porous Materials Association (AdvaPor), Strasbourg
- Allianz für Gebäude-Energie-Effizienz (geea), Berlin
- ASTM International, Philadelphia
- BDI – Initiative „Energieeffiziente Gebäude“, Berlin
- Connect Deutschland e.V., Aschheim
- dena – Deutsche Energie-Agentur GmbH, Berlin
- DGfH – Deutsche Gesellschaft für Holzforschung e.V., Munich
- DKV – Deutscher Kälte- und Klimatechnischer Verein e.V., Stuttgart
- DVM – Deutscher Verband für Materialforschung und -prüfung e.V., Berlin
- DIN Deutsches Institut für Normung e.V., Berlin
- EAE – European Association for External Thermal Insulation Composite Systems, Baden-Baden
- E2BA – Energy Efficient Buildings Association, Brussels
- Fachverband Gebäude-Klima e.V., Bietigheim-Bissingen
- Fachverband Luftdichtheit im Bauwesen e.V., Kassel
- Fachverband Innendämmung e.V., Frankfurt am Main
- Forschungsgesellschaft für Straßen- und Verkehrswesen, Cologne
- GRE – Gesellschaft für Rationelle Energieverwendung e.V., Kassel
- Industrie-Förderung GmbH, Berlin
- L’Institut International du Froid (IIF), Paris
- TÜV – Technischer Überwachungsverein Bayern e.V., Munich
- Vacuum Insulation Panel Association (VIPA International), USA
- vbw – Vereinigung der bayerischen Wirtschaft e.V., Munich; (sponsoring member)
- VFBau – Verein zur Förderung der Normung im Bereich Bauwesen e.V., Berlin
- VMPA – Verband der Materialprüfungsanstalten e.V., Berlin

FIW München is also engaged in a number of additional project-related cooperation and framework agreements, especially in the field of research and development, which are subject to confidentiality. An institutional link is maintained with the Munich University of Applied Sciences, where the director of the institute, Prof. Andreas H. Holm teaches.

International bodies and committees

CEN (Comité Européen de Normalisation)

- TC 88 Thermal Insulating Materials and Products
  Prof. Dr.-Ing. A. Holm (Chairman)
- TC 88 / WG 1 General Test Methods
  C. Karrer
- TC 88 / WG 1 General Test Methods – Ad hoc Group Ageing (accelerated aging for XPS, PUR, PF)
  W. Albrecht
- TC 88 / WG 2 Coordination Group
  R. Schreiner, Prof. Dr.-Ing. A. Holm
- TC 88 / WG 4 Expanded Polystyrene Foam (EPS)
  S. Sieber, Prof. Dr.-Ing. A. Holm
- TC 88 / WG 4 / Drafting Panel
  S. Sieber
- TC 88 / WG 4 / TG ETICS
  S. Sieber
- TC 88 / WG 5 XPS
  S. Sieber
- TC 88 / WG 7 Phenolic Foam
  W. Albrecht
- TC 88 / WG 8 Cellular Glass (CG)
  S. Sieber
- TC 88 / WG 10 Building Equipment and Industrial Installations
  R. Schreiner (Convenor), Prof. Dr.-Ing. A. Holm
- TC 88 / WG 10 Building Equipment and Industrial Installations – Task group Test methods (TGTM)
  R. Schreiner (TG Leader)
- TC 88 / WG 11 Vacuum-Insulation-Panels (VIP)
  C. Sprengard, Prof. Dr.-Ing. A. Holm
- TC 88 / WG 12 Expanded Perlite Boards
  W. Albrecht
- TC 88 / WG 16 Evaluation of Conformity
  Dr. rer. nat. R. Gellert
- TC 88 / WG 17 Wood Fibre Boards (WF)
  Dr.-Ing. S. Treml
- TC 88 / WG 18 ETICS
  S. Sieber, Prof. Dr.-Ing. A. Holm
- TC 88/TG Liaison to TC 350/351
  Dr. rer. nat. R. Gellert (Convenor)
- TC 88 / WG 22 Factory made Calcium Silicate (CS) Products
  Prof. Dr.-Ing. A. Holm
- TC 89 Thermal performance of buildings and building components
  Prof. Dr.-Ing. A. Holm
- TC 89 / WG 14 Determination of Thermal Resistance at Elevated Temperatures Using the Guarded Hotplate Method
  R. Schreiner
- TC 254 Flexible Sheets for Waterproofing
  Dr.-Ing. S. Treml
- TC 254 / TG WG 9 and 10 Artificial Ageing
  Dr.-Ing. S. Treml (Convenor)
- Group of Notified Bodies-CPR / SG 19 Thermal Insulation Products
  W. Albrecht, R. Schreiner

CEN Certification

- SDG 5 Thermal Insulation Products, Expert Group for Thermal Insulation (Creation of a uniform test level for thermal conductivity and all other properties of insulation materials in Europe)
  W. Albrecht

ISO (International Organization for Standardization)

- TC 163 Thermal Performance and Energy Use in the Built Environment SC1
  Prof. Dr.-Ing. A. Holm (Chairman)

QAC (Quality Assurance Committee)

- VDI-KEYMARK Scheme for Thermal Insulation Products for Buildings and for Building Equipment and Industrial Installations, the Voluntary Product Certification Scheme
  R. Schreiner (Co-Chairman)
- Laboratory Group
  R. Schreiner

Other bodies

- Fachverband Innendämmung FV ID
  C. Sprengard
- Vacuum-Insulation-Panels International Association VIPA
  C. Sprengard
- International Vacuum-Insulation-Panels Symposium – Scientific Committee
  C. Sprengard
- Advanced Porous Materials Association ADVAPOR
  C. Sprengard

National bodies and committees

AGI (Arbeitsgemeinschaft Industriebau)

- AGI Working documents Q-series
  R. Alberti

GSH (Güteschutzgemeinschaft Hartschaum e.V.)

- In-situ formed dispensed rigid polyurethane (PUR) (RAL-RG 710/7)
  R. Alberti
- GFA-PUR – Joint expert committee PUR roof spray foam and PUR spray foam
  S. Kutschera
- Working group Polystyrol (AAPS)
  S. Sieber
- Quality committee
  S. Sieber
- Steering committee
  S. Sieber

DIBt (Deutsches Institut für Bautechnik)

- SVA-A materials for thermal and sound insulation
  W. Albrecht
- SVA-B1 thermal conductivity
  W. Albrecht
- SVA-B3 thermal insulation outside the membrane
  W. Albrecht
- SVA Durability of moisture-variable vapour control layers
  Dr.-Ing. S. Treml
- Ad hoc committee: Load-bearing thermal insulation of greater thickness under foundation slab
  W. Albrecht
- ABM colloquium of the fire testing laboratories
  W. Albrecht
- Experience exchange on testing, inspection and certification bodies for, foam plastics and wood wool
  W. Albrecht

Hauptverband der Deutschen Bauindustrie (HDB) – Bundesfachabteilung WKSB

- Technical committee (TC)
  R. Schreiner

IVPU (Industrieverband Polyurethan-Hartschaum e.V.)

- Technical committee of the Industrieverband Polyurethan-Hartschaum
  W. Albrecht

ÜGPU (Überwachungsgemeinschaft Polyurethan-Hartschaum e.V.)

- Expert committee (analysis of third-party monitoring results of ÜGPU)
  W. Albrecht

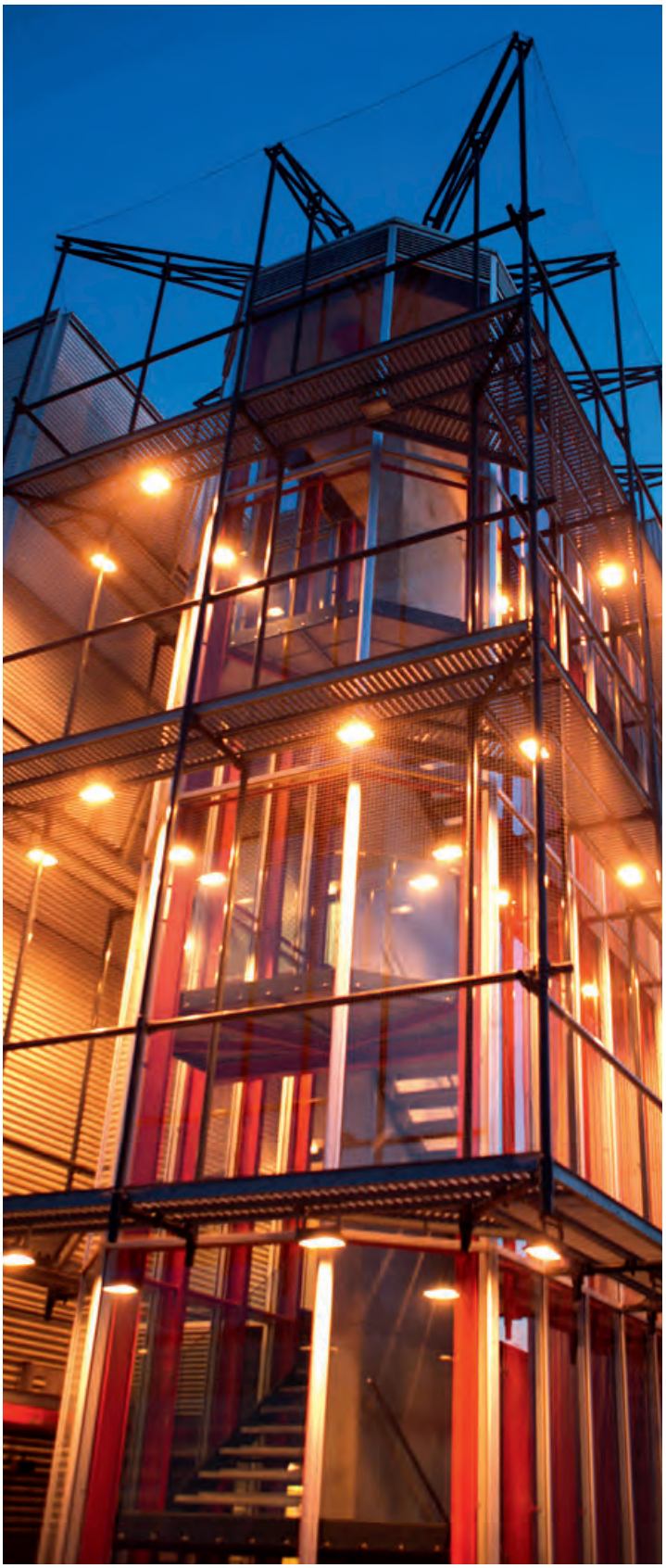
VDI (Verein Deutscher Ingenieure e.V.)

- Expert committee “Thermal insulation VDI 2055”
  R. Schreiner (chairman)
- Guidelines committee VDI 4610
  K. Wiesemeyer (chairwoman), R. Schreiner
- VDI-Gesellschaft Energie und Umwelt (VDI-GEU) division 1
  R. Schreiner

DIN NABau (Deutsches Institut für Normung e.V.)

- NA 005-56 FBR “KOA 06 Energy saving and thermal insulation”
  Prof. Dr.-Ing. A. Holm (chairman) (coordination committee)
- NA 005 BR “Advisory board of the DIN building standards committee (NABau)”
  Prof. Dr.-Ing. A. Holm
- NA 005-12 FBR “Steering committee division 12 - energy performance”
  Prof. Dr.-Ing. A. Holm
- NA 005-56-10 AA “Insulation work on technical installations”
  R. Schreiner
- NA 005-56-60 AA Thermal insulating materials (SpA to CEN / TC 88, ISO / TC 163 and ISO / TC 61)
  Prof. Dr.-Ing. A. Holm (Obmann)
- NA 005-56-60 AA Thermal insulating materials
  W. Albrecht, R. Schreiner
- NA 005-56-60, Ad hoc 04 EPS
  S. Sieber
- NA 005-56-65 AA “Vacuum insulation panels (VIP)”
  C. Sprengard
- NA 005-56-69 AA “Insulating materials for technical installations in buildings and industry”
  R. Schreiner (chairman)
- NA 005-56-90 AA “Structural thermal insulation in building construction” (SpA to CEN / TC 89 and ISO / TC 163) (including standards series DIN 4108)
  Prof. Dr.-Ing. A. Holm (chairman)

- NA 005-56-92 AA Characteristic values and requirement conditions for heat transmission; design values of thermal conductivity (DIN 4108-4) and minimum requirements for insulating materials (DIN 4108-10)
  W. Albrecht (chairman)
- NA 005-56-93 AA Air tightness
  (SpA ISO / TC 163 / SC1 / WG10)
  Dr.-Ing. S. Treml
- NA 005-56-97 AA Transparent components
  (SpA ISO / TC 163 / SC1 / WG 14)
  C. Sprengard
- NA 005-56-98 AA Thermotechnical measurement
  W. Albrecht, R. Schreiner
- NA 005-56-99 AA Moisture
  (Sp CEN / TC 89/WG 10)
  Prof. Dr.-Ing. A. Holm
- NA 005-02-09 AA Waterproofing membranes
  (Sp CEN / TC 254)
  Dr.-Ing. S. Treml
- NA 005-02-91 AA Flexible membranes under roof coverings (Sp CEN / TC 254 / WG 9)
  Dr.-Ing. S. Treml
- NA 005-02-92 AA Sarking boards
  (Sp CEN / TC 128 / SC 9 / WG 5)
  Dr.-Ing. S. Treml
- NA 042-02-01 AA Fibreboards
  (SpA CEN/TC 88/WG 17)
  Dr.-Ing. S. Treml



Developments regarding VDI guidelines

The expert “Thermal insulation” committee has been established in specialist area 1 “Energy technology” of the VDI-Gesellschaft Energie und Umwelt (VDI-GEU). This VDI expert committee is responsible for several VDI guidelines for the “Technical insulation” sector, which are regularly submitted for confirmation or revision.

Guideline series VDI 2055 “Thermal insulation of operational installations in industry and in building equipment”.

The guideline series VDI 2055 “Thermal insulation of operational installations in industry and in building equipment” consists of three parts. It supports plant planning by providing calculation documents for the design of insulation and provides information on how to verify the assured properties of insulation materials and systems. The chairman of the guidelines committee is Dipl.-Ing. Roland Schreiner from the Forschungsinstitut für Wärmeschutz e. V. München.

VDI 2055 part 1: “Thermal insulation of operational installations in industry and in building equipment” - calculation basics (August 2019 edition, draft)
The complete revision of part 1 was completed in 2019. The VDI editorial committee has published the draft. The next edition of VDI 2055 part 1 is expected to be available at the end of 2020.

VDI 2055 part 2: “Thermal insulation of operational installations in industry and in building equipment - technical principles for testing the properties of insulating materials” (October 2013 edition)
Part 2 is currently under revision and will be addressed at subsequent meetings of the guidelines committee.

VDI 2055 part 3: “Thermal insulation of operational installations in industry and in building equipment - technical principles for testing the thermal properties of insulation systems and determining total heat losses” (April 2012 edition)
Part 3 has been confirmed, no revisions are currently planned.

All parts can be purchased at www.vdi.de/2055.

ROLAND SCHREINER (FIW MÜNCHEN)

VDI 4610 guideline series “Energy efficiency of industrial installations”

The VDI 4610 guideline series “Energy efficiency of industrial installations” applies to the thermal insulation of operational installations in industry and building services.

KARIN WIESEMEYER (FIW MÜNCHEN)

This guideline provides a tool to determine potential savings in thermal losses and conceive measures for effective insulation, taking into account ecological and economic aspects. It draws on the life cycle assessment of insulation systems, thereby supporting climate protection measures. The chairwoman of the guidelines committee is Dipl.-Ing. Karin Wiesemeyer from the Forschungsinstitut für Wärmeschutz e. V. München.

VDI 4610 part 1: “Energy efficiency of industrial installations - Thermal insulation” (January 2018 edition).

VDI 4610 part 2: “Energy efficiency of industrial installations - Thermal bridge catalogue” (December 2018 edition).

VDI 4610 part 3: “Energy efficiency of industrial installations - Economical insulation systems” (August 2019 edition, draft)
Part 3 has been created. The VDI editorial committee has published the draft. The first edition of VDI 4610 part 3 is expected to be available at the end of 2020.

All parts can be purchased at www.vdi.de/4610.

4 Testing and surveillance

General information

In future, only a limited number of thermal insulation materials without a European product standard or European Technical Assessment (ETA) will be subject to the separation of tasks stipulated by the State Building Code (LBO) into a testing body responsible for conducting product tests, a surveillance body responsible for audits and withdrawals in the manufacturing plant and a certification body responsible for assessing test and audit results and issuing certificates of conformity. The conformity assessment of construction materials pursuant to the European Construction Products Regulation (EU-CPR) does not require the existence a surveillance body. All conformity tasks are carried out by a certification body and a testing body, whereby the responsibilities of the national testing body such as conducting audits of manufacturing plants and collecting product samples are assigned to the certification body. The latter furthermore reserves the right to assign a certain number of tasks to other bodies such as the testing body. As a result, employees from the testing body responsible for supervising insulation material manufacturers often work independently in the same manufacturing plant on the same insulation material both acting as employees of the testing body pursuant to the LBO and on behalf of the certification body according to EU-CPR. On the other hand, according to the CPR, employees from the certification body are also permitted to assume the tasks of the testing body at the manufacturing plant pursuant to the State Building Code. They nonetheless remain the competent contact persons for all questions related to quality assurance and proof of conformity of thermal insulation materials on a national or European basis. This is particularly relevant since, following the ECJ ruling in Case C-100/13, thermal insulation materials subject to European regulatory framework can no longer be regulated at national level, contributing to the importance of testing and, if necessary, certification by a European notified body. However, the senior building authorities of all federal states have issued decrees on the enforcement of the CPR permitting the continued use of general building authority approvals, provided that their ancillary conditions, i.e. compliance with self-monitoring and external surveillance by a surveillance body recognised pursuant to the LBO, are fulfilled. It therefore follows that the tasks of the surveillance body recognised pursuant to the LBO and the notified certification body will be subject to further overlap in the future. This applies in particular to the conclusion of voluntary certification schemes by the accredited certification body of FIW München. The testing body aims to offer all tests related to thermal insulation materials or, in exceptional cases, to mediate them through cooperation with other competent bodies. Decades of experience from the largest testing laboratory for thermal insulation materials in Europe have been incorporated into the corresponding standards through participation in national and international committees. This consequently enables the quick and full implementation of new test procedures at FIW München and provides manufacturers with a method to verify the suitability of their products. FIW München is recognised and accredited as a testing laboratory pursuant to EN ISO/IEC 17025 on a national (testing, surveillance and certification body) and European (notified body) level. Its special expertise is further exhibited by its leading cooperation in the “Lambda Expert Group” for the voluntary European certification scheme CEN KEYMARK, whereby laboratories registered to determine the thermal conductivity of thermal insulation materials audit each other’s work and confirm measuring precision through interlaboratory testing. The laboratory group also additionally focuses on determining the upper application limit temperature and water-soluble chlorides in the field of technical insulation materials. We are notably proud of our discovery of a comparative insulation material (expanded glass granulate) that ensures the required European level of thermal conductivity at higher temperatures. In the field of “technical insulation”, the testing body conducts thermal and mechanical tests in temperatures ranging between -180 °C to and +1000 °C. The laboratory tests conducted in line with European testing standards are supplemented by the recording of influencing variables on application-related insulation structures under practical conditions, e.g. on pipelines or under vibrations. In addition to providing order verification for all technical insulation materials, the active design of the European voluntary quality assurance scheme (VDI/KEYMARK) constitutes a key service offered to our customers.

Accreditation for testing the fire behaviour of construction products pursuant to DIN EN ISO 1182 and DIN EN ISO 1716

The protection of citizens with regard to building safety, healthy and the environment has been declared a top priority by Germany and the European Commission. Construction products subsequently require testing and classification with regard to their fire behaviour by an accredited and notified testing laboratory prior to placement on the market.

FIW München welcomes this requirement and additionally conducts two additional fire tests after successful accreditation to determine the tendency of a construction product to continue to carbonize in accordance with DIN EN 16733. The non-combustibility test according to DIN EN ISO 1182 is used to determine whether a construction product does not contribute to a fire or whether it only contributes to an insignificant level, without its practical application being taken into account.

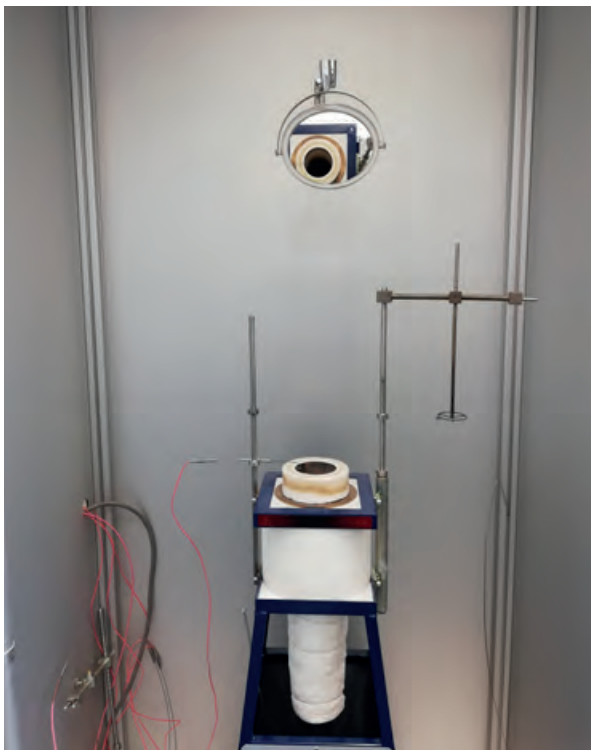
A representative sample is placed in a 750 °C furnace and the duration of ignition and the change in temperature are observed and recorded. If the product remains within the limits for loss of mass, duration of ignition and increase in temperate, the test is deemed to have passed.

The results of the non-combustibility test according to DIN EN ISO 1182 can be used to classify the product pursuant to DIN EN 13501-1 and applied to building material classes A1, A2, A1L and A2L.

The second accredited fire test successfully conducted in 2019 was the determination of the gross heat of combustion according to DIN EN ISO 1716 - which is used to determined the potential maximum heat release of a construction product following complete combustion without taking its practical application into account.

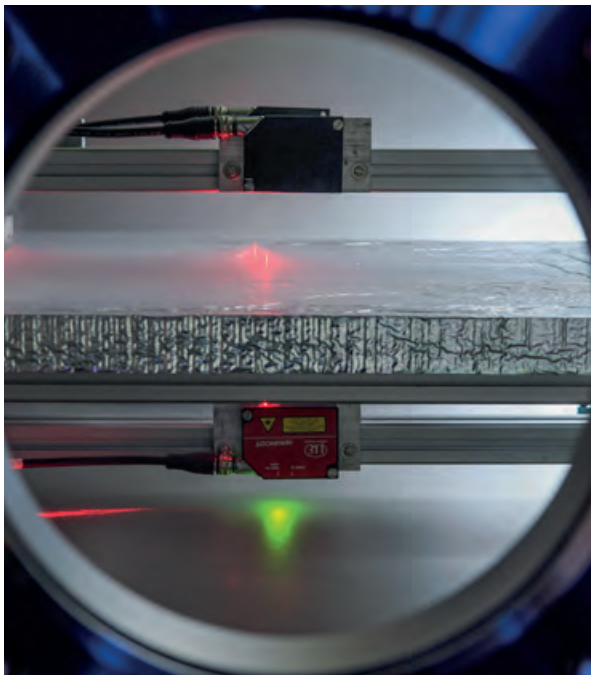
A test specimen with a determined mass is combusted at constant volume in an oxygen atmosphere in a bomb calorimeter. The heat of combustion determined in this process is calculated by the increase in temperature, taking into account the heat loss and the latent heat of evaporation for water.

These results can also be used to obtain classification according to DIN EN 13501-1. They are applicable to the building material classes A1, A2, A1L and A2L.



Technical specifications

The energy efficiency of buildings and technical installations is, to a certain extent, contingent on the testing of materials, certification and quality assurance. In addition to our research and development work, we operate test laboratories to the highest quality standards and have gained decades of experience and a high reputation. We operate state-of-the-art testing facilities and employ a wide range of analysis techniques. Due to the increased demand for corresponding testing, our test laboratory is continuously experiencing growth in terms of both equipment and personnel. FIW München currently has the following testing facilities:



Testing and trial facilities for insulation materials in technical applications

Evaluation of the performance of insulation materials through testing according to EN 14303-14309, EN 14313, EN 14314

Thermal conductivity of insulation materials pursuant to the test specifications of DIN EN 12664, DIN EN 12667, ISO 8301, ISO 8302, ASTM C 177, ASTM C 518 and the guidelines of DIBt, Berlin

- in temperatures ranging from -180 °C to 900 °C
- at an average temperature of 10 °C
- at an average temperature of 40 °C

Thermal conductivity of pipe insulation materials and pipe insulation and pipe systems pursuant to the test specifications of DIN 52613, DIN EN ISO 8497

- in temperatures ranging from -70 °C to +300 °C
- at a mean temperature of 10 °C for cold insulation
- At a mean temperature of 40 °C for insulation materials for the insulation of heating systems
- at a mean temperature of 50 °C for district heating pipelines

Dimensional stability/deformability

- according to DIN EN 1603 in a normal climate
- in predefined temperature and moisture conditions according to DIN EN 1604

Behaviour at higher temperatures

- Application limit temperature according to DIN EN 14706 and DIN EN 14707
- Application limit temperature with and without vibrations

Measurements of the heat transfer and the temperature field with standardised and specialised measuring and testing equipment

- for insulation systems
- for building components

Requirements for the fire protection/fire behaviour of building materials

- Non-combustibility test according to DIN EN ISO 1182
- Determination of the gross heat of combustion according to DIN EN ISO 1716
- Ignitability of products subjected to direct impingement of flame according to DIN EN ISO 11925-2

Mechanical properties

- Condition, dimensions, apparent density according to DIN EN 1602 and DIN EN 13470
- Tensile strength according to DIN EN 1607, pull-of-resistance, transverse tensile strength
- Deformation under defined compressive load and temperature conditions according to DIN EN 1605
- Compression behaviour according to DIN EN 826
- Shear behaviour according to DIN EN 12090
- Bending behaviour according to DIN EN 12089
- Behaviour under point load according to DIN EN 12430
- Coefficient of thermal expansion according to DIN EN 13471
- Compressive creep according to DIN EN 1606

Hygric properties and behaviour in frost

- Determination of long term water absorption by immersion according to DIN EN 12087 when fully immersed
- Water absorption with temperature change 20 °C/40 °C
- Determination of long term water absorption by diffusion 50 °C/1 °C according to DIN EN 12088
- Determination of short term water absorption by partial immersion according to DIN EN 1609
- Determination of water content according to DIN EN 322
- Water vapor transmission properties according to DIN EN ISO 12572, DIN EN 12086 DIN EN 13469

Other properties

- Determination of volume percentage of closed cells of rigid materials according to ISO 4590
- Cell gas composition with a gas chromatograph
- Determination of trace quantities of water soluble chloride and pH according to DIN EN 13468
- Thermal stability
- Determination of airflow resistance according to DIN EN 29053
- Non-fibrous components (melted beads)
- Loss on ignition according to DIN EN 13820
- Determination of the silicon content of insulation materials

Acceptance measurements

- On-site measurements with a heat flow meter and/or infrared camera

Testing and trial facilities for insulation materials in building construction

Evaluation of the performance of insulation materials through testing

- according to EN 13162-13171

Approval tests for new insulation materials

- according to testing specifications from DIBt

Initial tests for thermal insulation materials

- according to testing specifications from DIBt for type-approvals (BAG) or according to the European Assessment Document (EAD)

Fire behaviour and carbonization/smouldering

- Classification of the fire behaviour according to DIN EN 13501-1, class E
- Ignitability of products subjected to direct impingement of flame according to DIN EN ISO 11925-2
- Review of the building material class DIN 4102-B2 (normal ignitability)
- Determination of the tendency to carbonize continuously according to DIN EN 1673
- Non-combustibility test according to DIN EN ISO 1182
- Determination of the gross heat of combustion according to DIN EN ISO 1716

Testing the thermal conductivity of construction and thermal insulation products according to

DIN EN 12664, DIN EN 12667, DIN EN 12939, ISO 8301, ISO 8302, ASTM C-177 and DIBt guidelines, Berlin

- at an average temperature in the temperature range -30 °C to +80 °C
- at an average temperature of 10 °C

Mechanical properties

- Condition, dimensions, thickness, apparent density
- Thickness for floating floor insulating products according to DIN EN 12431 (compressibility
- Tensile strength, pullo-of-resistance, transverse tensile strength (DIN EN 1607/1608)
- Compression behaviour according to DIN EN 826
- Shear behaviour according to DIN EN 12090
- Bending behaviour according to DIN EN 12089
- Behaviour under point load according to DIN EN 12430
- Dynamic stiffness according to DIN EN 29052-1
- Coefficient of thermal expansion according to DIN EN 13471
- Slump after vibration
- Slump after climate testing 40 °C / 90 % r.h.
- Long-time creep behaviour under compressive stress according to DIN EN 1606 up to a thickness of 300 mm
- Dowel pull-through strength according to ETAG 004

Hygric properties and behaviour in frost

- Determination of long term water absorption by immersion according to DIN EN 12087 when fully immersed
- Water absorption during temperature change 20 °C/40 °C
- Determination of long term water absorption by diffusion 50 °C/1 °C according to DIN EN 12088
- Determination of freeze-thaw resistance and compression strength according to DIN EN 12091
- Determination of water vapour transmission properties according to DIN EN ISO 12572, DIN EN 12086, DIN EN 13469
- Conditioning to moisture equilibrium under specified temperature and humidity conditions according to DIN EN 12429
- Hygrothermal performance of building materials and products according to DIN EN ISO 12571 (DIN 52620)
- Determination of short term water absorption by partial immersion according to DIN EN 1609
- Moisture content according to DIN EN 322

Dimensional stability/deformability

- Determination of dimensional stability under constant normal laboratory conditions according to DIN EN 1603
- Dimensional stability under specified temperature and humidity conditions according to DIN EN 1604
- Deformation under defined pressure and temperature conditions according to DIN EN 160

Other properties

- Determination of volume percentage of closed cells of rigid materials according to ISO 4590
- Cell gas composition with a gas chromatograph
- Determination of the chloride content of wood wall panels according to DIN EN 13168
- Determination of airflow resistance according to DIN EN 29053

Deconstruction of testing areas that are no longer in use - we're creating space

Test benches which were previously installed are not always used indefinitely or indeed required by FIW customers. Within the scope of several projects financed by the current Federal Ministry of Economical Affairs and Energy, FIW München, as a member of the AiF Arbeitsgemeinschaft industrieller Forschungsvereinigungen, installed an electrically heated boiler wall (up to approx. 600 °C) with a guard ring and heat exchanger in our large hall over 30 years ago. Application-related safety factors influencing the thermal conductivity of the insulation materials used could be determined for a range of differently designed insulation systems. The observed additional energy losses were primarily the result of convective flows or extreme differences in temperature. These factors have since been incorporated as the operating thermal conductivity in the guideline VDI 2055 part 1 "Thermal insulation of operational installations in industry and in building equipment - calculation basis". Due to the fact that the planning engineers and architects found the application-related factors listed in the aforementioned VDI guideline to be sufficient for their daily work, no further testing was conducted on the boiler wall.

In 2019, the time had come to dismantle the test bench. This process took over a week. There was a palpable sense of melancholy when Dipl.-Ing. Roland Schreiner reminisced on "his test bench". "... what could have been investigated ...", whilst witnessing the final heating elements being dismantled by mechanics.

The good news: The resulting space in the hall was only empty for one week. The hot box pipe is now located there due to the operational safety offered in the hall required for its latest application in deep freezing with liquid nitrogen. We will continue to use this space for special constructions in the future and look forward to the challenges ahead.

5 Certification

In recent years the certification body of FIW München has increasingly evolved from a certification body according to the State Building Code into a certification body according to system 1 of the EU CPR and for voluntary certification schemes.

In addition to the CE certificates, which are mandatory under system 1 of the EU CPR, we also provide the following voluntary certification schemes for insulation manufacturers and associations:

- Certification scheme for ETICS insulation materials made of expanded polystyrene (EPS)
- Expanded scheme for ETICS insulation materials made of expanded polystyrene (EPS)
- Certification scheme for ETICS insulation materials made of mineral wool
- Certification scheme for ETICS insulation materials made of wood wool
- Certification scheme for ETICS insulation materials made of phenolic resin
- Certification scheme for thermal insulation materials for buildings made of polyurethane (PU)
- Certification scheme KEYMARK thermal insulation materials for buildings
- Certification scheme VDI/KEYMARK technical insulation

All certification schemes are accredited by the German Accreditation Body (DAkkS) and have been recognised as neutral and independent.

Two thermal insulation materials as load-bearing thermal insulation outside the waterproofing have recently been certified with the new DAkkS certificate of 10/04/2018:

- EAD 040650-00-1201 Extruder foamed polystyrene rigid foam sheets
- EAD 040777-00-1201 Cellular glass

This enables us to offer our customers a CE certificate according to system 1 for this application.

Since 2019, we have offered our customers two additional voluntary certification schemes for insulation materials outside the waterproofing:

- Certification scheme for insulation boards made of extruded polystyrene foam (XPS) as thermal insulation outside the waterproofing
- Certification program for insulation boards made of cellular glass (CG) as load-bearing layer and thermal insulation outside the waterproofing

In cooperation with the testing body of FIW München we offer

- a quality certificate on the testing of all characteristics of the control plan according to ETA (European Technical Assessment) derived from the EAD (European Assessment Document), and
- an application certificate for application in Germany, which enables the user of insulation materials to view and therefore verify that all requirements of the German Bauartgenehmigung, based on ETA, have been met (e.g. perimeter insulation in ground water, inverted roof as a green roof or parking level, thermal insulation as a load-bearing layer under the foundation slab)

We now consequently offer a full range of voluntary certification schemes. As in the past (when general building authority approvals were applicable), manufacturers of thermal insulation materials are able to verify that inspections of the manufacturing plant and the manufacturer's laboratory have taken place, along with annual random sample inspections and the confirmation of applicability, to planners, building contractors and end customers. In addition, they also receive quasi automatically measured values from external surveillance conducted by a notified testing laboratory, which assist with the extension of the Bauartgenehmigung.

FIW München develops certification schemes for type-approvals based on ETAs. These voluntary certification schemes reduce the liability risk of planners and contractors whilst simultaneously increasing customer confidence in the applicability of the insulation materials. They also combine the various European and building authority requirements into one uniform scheme and enable different verification procedures to be merged on one level. Furthermore, these certificates can be used to verify compliance with individual requirements for the respective application.

6 Research and Development

The research and development segment is responsible for the research activities of the institute with regard to thermal insulation. The key focus of R&D work is optimising the thermal conductivity and moisture content of insulation and construction materials as well as building components and insulation structures. Further developments achieved in these fields are increasingly supported by simulations. However, the quality of the calculations obtained hinges on the reliability and accuracy of the material data with which the programs are "fed". In order to ensure nothing is left to chance, state-of-the-art equipment and testing facilities are available at FIW München to facilitate the quick and reliable determination of material parameters. FIW München is continuously expanding its range of testing facilities.

In recent years, the structure laboratory in particular has been established and developed to enable FIW München to access powerful analytics to determine basic material properties. This includes a fully automated device to measure the sorption isotherms of building and insulation materials, plasters and mortars in temperatures ranging from 5°C to 60°C at air humidity levels from 0% to 98%. A helium pycnometer is used to determine the void content and theoretical density of materials. The range of testing offered by FIW München is supplemented by flexible options for climate storage in a wide range of temperatures and humidity levels. Variable air velocities with laminar flow can also be used to test ageing in airtight bonds. Images of the structure and surfaces of materials can be captured with a powerful digital microscope. Special software makes it possible to combine images from different angles of inclination with an extended depth of field to map three-dimensional structures on surfaces, for example.

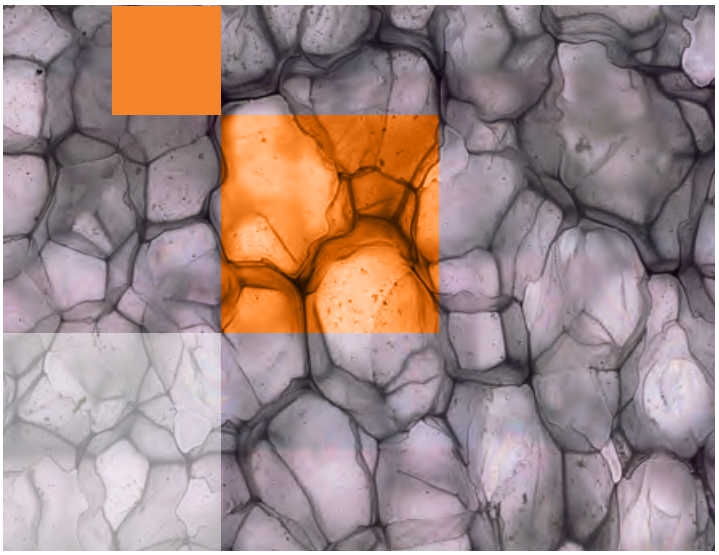
The R&D segment is continuously working on the expansion of characterisation possibilities for the structure and physical properties of construction and insulation materials. It currently has plans to extend the analysis possibilities for void contents and pore size distributions of materials and to set up a spectral analysis to identify materials and their ingredients.

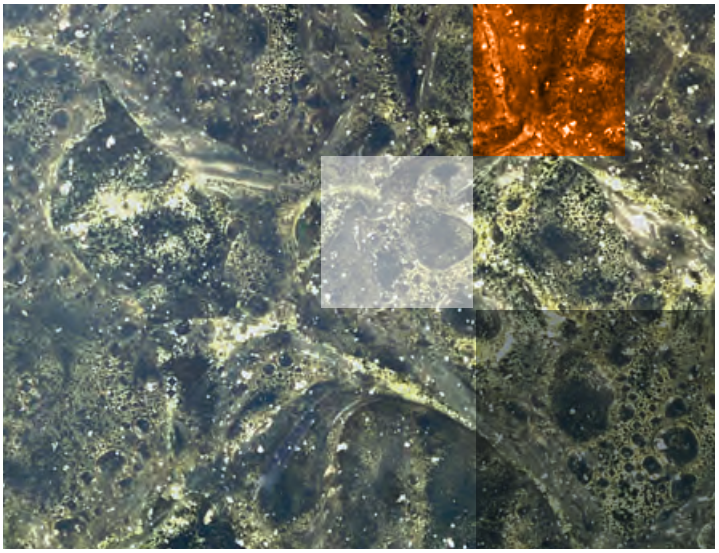
The simulations on components and building elements can be verified by tests in the institute's hot-boxes on entire building elements such as facades, windows, gates, masonry and technical insulation systems on a 1:1 scale. One notable area of expertise of the segment is the flexible combination of calculations, simulations and laboratory tests. Reliable material values which form a basis for numerical calculations are often not readily available, especially for new insulation materials and construction products such as vacuum insulation panels (VIP), insulation materials made from aerogels and microporous materials (APM "Advanced Porous Materials"), thermal insulation plasters, moisture-adaptive vapour barriers, low-emissivity coated foil insulation materials and bricks filled with insulation material. FIW München determines these material values as a basis for computational investigations on the product and provides support for the manufacturers on their path to market launch. Last year, a primary focus was the further development and improvement of insulation materials from renewable raw materials within the framework of industrial orders and a research project on the Fachagentur nachwachsende Rohstoffe (FNR).

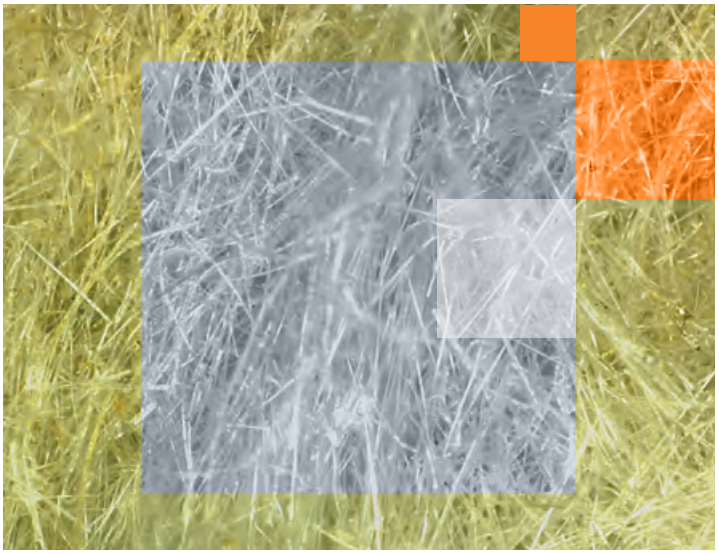
The segment's thermal and humidity engineering know-how is also used by other industries: Planners and manufacturers of chemical and power plants, manufacturers of refrigerators and freezers, air conditioning, transport containers and vehicles regularly rely on our expertise to optimise the thermal behaviour and long-term behaviour in the application of their products. Steady-state observations of heat transfers are no longer sufficient under normal circumstances for these applications, with predominantly changing boundary conditions instead required as a basis - e.g. daily or annual temperature fluctuations or climate data accurate to the hour for a variety of locations. These temperature fluctuations are often combined with realistic humidity conditions in order to analyse the moisture distribution in systems or to exclude any damage to building structures from the outset. Laboratory tests and simulations can then be validated by measurements recorded on site within the scope of surveillance, for example.

The success of the energy revolution hinges on increased energy efficiency in existing buildings and operational installations. It will not be possible to achieve the ambitious energy-saving targets of the German government without a reduction in the thermal loss of existing buildings - irrespective of how efficiently new buildings are constructed.

The “Research and Development” segment provides support along the entire construction value chain: From material to component and from component to the complete heat-insulating building envelope. The location of the building, the climate and even the user behaviour of the residents are all taken into account as part of the holistic approach in order to obtain reliable results concerning the long-term functionality of constructions and restructuring measures. Another key focus last year was the research project “Rap-id-U” whereby FIW München took over the validation of the in-situ measuring instruments in the laboratory.







Research fields and services

Research

- Research projects on all topics concerning the thermal and moisture protection of construction elements, individual components, complete systems, structural installations and buildings
- Research on energy saving in buildings and energy efficiency
- Application-oriented research on insulation materials, construction materials, components and systems
- Research on fundamental heat and moisture-related issues such as the systematic investigation of production parameters on the heat-related properties or the influence of moisture on the thermal conductivity of construction and insulation materials
- Applications for research projects and project management for research contracts in Germany and Europe

Energy requirements of buildings

- Determination of the energy requirements of components, systems and buildings
- Holistic approach to thermal loss, taking the location, the climate and the user behaviour of the residents into account
- Assessment of potential for restructuring

Development of products and materials

- Optimisation of the thermal and moisture parameters of insulation and construction materials as well as of construction components and insulation structures
- Supporting the further development of materials, products, components, systems and parts through measurements, calculations and simulations
- Measurement of material parameters as input data for thermal engineering simulations
- Determination of the heat transfer of components and parts on a 1:1 scale up to a component size of 3.5 m x 3.5 m
- Combination of numerical calculations, simulations and laboratory investigations for the further development of established products (e.g. for insulation materials made of renewable raw materials) and for new construction products (e.g. vacuum insulation panels (VIP) and insulation materials made of Advanced Porous Materials (APM)) and scientific support from initial concept to market launch
- Calculations, simulations and measurements of thermal and moisture properties; also for industries not related to construction, i.e. for refrigerators and in the logistics sector for transport containers and refrigerated vehicles
- Support along the entire construction value chain; from material to component and from component to the complete heat-insulating building envelope

Other research and simulations

- Simulations in the transient state with increasing or decreasing temperatures
- Simulation of movement in liquids and gases (CFD)
- Measurements of components or materials with realistic moisture content in order to analyse moisture distributions in systems and better assess damage
- On-site investigations and monitoring of existing and newly constructed buildings
- Investigation and simulation of the permanent functionality of constructions and restructuring measures
- Studies and assessments of Energy-Saving-Potential
- Thermal bridge catalogues
- Support with technical manuals and product documentation

Current research activities and new approvals in 2019

In recent years, FIW München has succeeded in increasing its R&D segment step by step. Major multi-year collaborative projects were once again carried out in 2019 and processed in the application phase. In addition to the public research projects mentioned in the following, increasingly more industrial partners from a wide variety of sectors have commissioned FIW München to conduct (concept) studies and (application-oriented) research, which are subject to confidentiality and therefore cannot be listed in this report.

New EU project “LightCoce”

The kick-off meeting for the LightCoce H2020 project was held in Athens from 23rd to 24th January 2019 at the premises of the project coordinator, the National Technical University of Athens (NTUA). The project aims to build an ecosystem for the development of lightweight multifunctional concrete and ceramic materials and structures. During this two-day meeting, the consortium discussed the general targets and tasks of the project, including detailed presentations of the five pilot lines provided by the project partners and the test cases conducted by the pilot users to validate the operation of the ecosystems. The pilot plants are accompanied by a wide range of characterisation possibilities at various institutes throughout Europe as well as offers for public relations, certification and standardisation, which will be made available to customers within the framework of the “Open Innovation Test Beds” (OITB). The OITB will be in operation from the second half of the project onwards by means of a non-profit organisation which has been specifically created for this purpose and will continue to exist once the project is completed. In total, the LightCoce project will bring together 26 partners from 9 EU countries over the next four years, representing 5 large companies, 8 Research and Technology Organisations (RTOs), 12 SMEs and 1 association.

LIGHTCOCE PROJECT PARTICIPANTS IN THE ITC LABS IN VALENCIA

This project is funded by Grant Agreement No. 814632 (H2020-NMBP-HUBS-2018) from the European Union Horizon 2020 Research and Innovation Programme.

https://www.lightcoce-oitb.eu

Research report on increasing energy efficiency through interior insulation systems

Gefördert durch:

Bundesministerium
für Wirtschaft
und Energie

In order to achieve better exploitation of the savings potential in existing buildings through interior insulation than previously possible, the Federal Ministry of Economics and Energy (BMWi) funded a project to research the hygrothermal properties of interior insulation systems. A primary objective of the research project was to counteract the uncertainties that exist regarding the application of interior insulation in the renovation sector, which currently hinder the widescale use of the systems. The economical thermal renovation of the majority of existing buildings in Germany is only feasible with interior insulation. Renovation is both desired and urgently required from an ecological point of view and with regard to the comfort of the residents.

During the four-year project duration, research partners FIW München and the Fraunhofer Institute for Building Physics IBP have developed a reliable evaluation and assessment system for interior insulation structures with regard to the permanent reduction of transmission heat losses and building physics boundary conditions. In order to achieve this, a wide range of existing and in emerging types of interior insulation materials were assessed in detail on the basis of their thermal, hygric and ecological properties. Energy and humidity measurements were taken in the standard cross section by hygrothermal simulations and validated by field tests in order to demonstrate the application areas and limits of various systems. Connection details and thermal bridges in various interior insulation systems were also heavily researched to determine the potential of interior insulation for intermittent operation.

The results achieved during the project may contribute to future guidelines for building professionals (builders, engineers and architects) and users (building owners and residents). They are intended to help better assess existing buildings and enable critical situations be identified as early as possible during the planning phase to facilitate the implementation of appropriate solutions.

The project on which this report is based was funded by the Federal Ministry of Economics and Technology under grant no. 03ET1248A. The author assumes sole responsibility for the content of this publication.

The final report can be downloaded here free of charge:

https://doi.org/10.2314/KXP:1670420760

Final report on the improvement of measurement accuracy for technical insulation

The development of novel thermal insulation systems such as polymers and aerogels with improved thermal properties, in which FIW München is actively involved, is already advanced. However, there is no currently reliable metrological framework to validate their use in technical insulation or for testing consistent quality up to 800 °C: Measurements of the thermal conductivity vary significantly (up to 15 %) between laboratories. A European research project conducted by the "National Metrology Institute" (NMI), which is responsible for the development and expansion of new and existing measurement methods, in collaboration with FIW München, aims to solve this problem. In addition to improving the test procedure, comparative samples were developed for use in equipment calibration and round robin tests, amongst other things.

The Forschungsinstitut für Wärmeschutz e. V. München successfully verified the accuracy of its two-plate apparatus used to determine temperature-dependent thermal conductivity and the high quality of sample handling.

All of these measures have created reliability and help to bring certified new products onto the market and reduce heat losses and the related costs for high-temperature processes.

High-temperature processes are common in many production industries, e.g. for steel and glass production or in petrochemical refining. Insulation materials are used to minimise heat loss throughout the entire system. All of these materials require certification to verify their insulation properties. Certificates are issued after testing is conducted in authorised laboratories subject to strict quality assurance criteria in accordance with the EN ISO/IEC 17025 standard. The assessment of the thermal properties is carried out using the two-plate method (guarded hot plate), whereby the material is measured at a certain temperature difference in the steady-state of heat transfer.

The research project "Metrology for thermal protection materials" commenced in June 2013 with the aim of improving the measurement accuracy of industrial metrology up to 650 °C. The aim of the project is to reduce the differences in measuring and equipment used by the national reference laboratories to such an extent that measurements can be performed with the reliability required to implement the mandatory European regulations (Construction Products Regulation EU No 305/2011).

Two major sources of errors were identified prior to the start of the project: the lack of homogeneous reference materials for comparative measurements and the tendency of the samples to be tested to change when heated. The project, funded within the framework of the EUROPEAN METROLOGY RESEARCH PROGRAMME (EMRP), was ultimately able to determine the sources of measurement errors during testing and consequently develop new approaches to improve measurement accuracy.

The three-year joint project "Metrology for thermal protection materials" between the European National Metrology Institutes (NMI) investigated the routinely applied "Guarded Hot Plate" method for measuring thermal conductivity and extended the traceability of the covered temperature range to 650°C. The project also validated a new reference material for use in equipment calibration and investigated materials for the construction of equipment, the performance of the associated sensors and the installation environment for the samples. This led to the creation of Best Practice Guidelines to improve the measurement accuracy for determining the temperature-dependent thermal conductivity of technical thermal insulation materials.

Impact report:

https://www.euramet.org

Full research report (English):

https://www.euramet.org

7 Research day of FIW München

The heat revolution in practice

The re-elected Chairman of the Board, Klaus W. Körner, opened the FIW Research Day 2019 on 23rd May 2019 following the general meeting in the Haus der Bayerischen Wirtschaft in front of 120 attendees.

FIW München and several external speakers held ten lectures chaired by the head of the institute, Prof. Andreas Holm to provide an overview of the innovations in certification and standardisation work, present information on current and recently completed research projects and studies as well as the latest developments in the field of high-performance insulation materials.

Many of the participants gladly took the opportunity to receive an in-depth debriefing on the topics in small groups at the subsequent convivial evening.

All of the slides from the presentations can be found at https://fiw-event.com/2019. A summary of the presentations can be found on the following pages.

A new technique for U-value measurements in situ - New opportunities for quality assurance? The initial findings from the “Rapid U” research project

The achievement of climate targets in the construction sector is largely contingent on quality assurance and ecological monitoring. Previously, the energy-relevant characteristics of building structures (in particular the quality of restructuring work) could only be assessed through cost-intensive, close ecological monitoring, with a primary focus on checking the insulation thicknesses and the manufacturer’s specifications in the plans, or using complex or non-destructive measuring methods. Arcada’s patented measuring method enables U-values to be checked on site, providing a quicker and more cost effective solution. As part of the RAPID-U research project, funded by the BMWi via the Project Management Organisation Jülich, validation measurements are carried out in the laboratory to investigate the measurement uncertainty of the process (FIW München task package) and large-scale field measurements are carried out in buildings to gain practical experience in operating the equipment (DEN e. V. task package).

MARITA KLEMPNOW (DEN E.V.)

The measurements are backed up by simulations of the heat transfer through various component structures with varying internal and external temperatures in order to identify the application limits for the equipment. This aims to provide energy consultants and experts with an inexpensive but nonetheless adequately accurate method to quickly determine the quality of components found in a building. The focus of this project is therefore translating laboratory test findings into practical application. In order to find a solution, the time period which provides the optimal measuring accuracy in laboratory tests will be determined and translated into practice on the basis of the measured temperature fluctuations of indoor and outdoor air. Detailed application guidelines have also been established for Rapid-U equipment in order to minimise additional influences on measurement uncertainty. The laboratory findings have been tested for their practical suitability by the research partner DEN e. V. in extensive field tests.

Long-term behaviour of EPS as perimeter insulation in theory and practice

EPS perimeter insulation has been taken as an example to demonstrate the classification of measured values and explain the significance of practical testing for the validation of dimensioning rules. Both laboratory tests and practical experience are used to assess construction products. In addition to roof and facade test areas, FIW München also has test areas for perimeter applications down to a depth of approx. 2 m.

In 2014, the IVH commissioned studies on these areas for EPS perimeter insulation and the first results are now available after an exposure period of 3.5 years. 12 insulation materials of different thickness, raw materials and manufacturing processes were used on the available areas.

The distinguishing feature of this project, apart from the number of different products under identical load conditions, is that laboratory tests were carried out at the beginning to determine the initial values for the insulation materials used. These values were then compared and evaluated with the results of individual properties following the removal of the insulation materials. No visible damage, deformity or changes in position could be determined in the removed samples after a period of 3.5 years. The pressure response and thermal conductivity in dry conditions remained the same.

A moisture increase of up to approx. 0.3 % was measured. Laboratory tests already demonstrated a tendency towards higher values for products with increased moisture content. The laboratory tests for water absorption can be correlated with the results of the practical tests. The measured thermal conductivity due to moisture absorption was found to be significantly below the respective dimension values of the products.

STEFAN SIEBER (FIW MÜNCHEN)

Damp insulation layers in flat roofs

A common question that arises when existing buildings are modernised is to what extent the previous structure of flat roof areas should be maintained, dismantled or replaced, if required.
The condition of the insulation material is generally provides clarity in this regard. As a rule, if moisture is found, the roof areas are dismantled and disposed of. The majority of the insulation materials used today are also moisture resistant for long periods of time. The compressive stability (or compressive stress when testing with fixed compression) is not significantly limited for a large number of insulation materials. Moisture tends to reduce thermal protection, but insulation nevertheless remains comparable to thinner dry insulation materials.

Current practical experiences regarding the preservation of damp insulation layers were compiled in the research report “Long-term behaviour of damp insulation materials on flat roofs - practical experience and heat flow measurements”, prepared in cooperation with FIW München. The thermal conductivity of damp insulation materials was also measured in the laboratory under both steady-state and transient conditions.

Practical experience was compiled from 100 responses to a survey of 1,400 publicly appointed and sworn experts on damage to buildings and from the roofing trade. In the last decade, roughly one third of the respondents experienced a total of 182 cases involving damp insulation materials in roof structures. Further damp damage only occurred after the waterproofing had been restored in 8% of the cases whereby damp insulation materials were left in the roof.

Damp insulation materials can be left in the roof provided that there are no moisture-sensitive materials (such as wood, cork, jute, possibly mineral wool, mechanical fasteners at risk of corrosion) in the insulation layer or directly adjoining it. The findings from practical experiences have been overwhelmingly positive.

Research on the heat flow curves for both steady-state and transient measurements demonstrates that

RALF SPILKER (AIBAU GGMBH)

the moisture correction coefficients stipulated in DIN EN ISO 10456, which can be used to determine the change in thermal conductivity as a function of moisture content, align well with the measurement results and are on the safe side for foam plastics. The values for mineral wool required verification through further investigations and demonstrated differences, especially with regard to the wide range of variation in the raw densities of mineral wool.

Certain effects of the heat flow curves measured on damp insulation materials are unable to be determined with the current state of knowledge. The moisture transport processes in insulation materials remains largely unresearched and is therefore not demonstrable through calculations. A sufficient explanation of the measured heat flow curves cannot be obtained by defining moisture transport exclusively on the basis of a constant diffusion current density characterised by the sd-value. Further research is still required on this topic. However, the results obtained thus far do provide a certain level of practical assistance.

Interior insulation and transient operation - How much potential is there for savings?

As a rule, initiatives to save energy in the construction sector tend to primarily target new buildings and turn a blind eye to existing ones.
In order to better assess the potential of existing building, a parameter study was conducted in WUFI® Plus as part of the BMWi-funded project “Energy Efficiency Improvement through Interior Insulation Systems”. The aim of the study was to quantify potential energy savings that could be achieved through the application of interior insulation in combination with intermittent heating. The combination of these measures proved to be advantageous, enabling quicker heating of the interior surfaces with intermittent heating due to the decoupling of the thermal storage mass of the solid outer walls during the application of the internal insulation.

CAROLIN KOKOLSKY (FIW MÜNCHEN)

The use of the interior space, insulation standards, heating systems and operating modes in place were varied in WUFI® Plus (1440 parameter combinations in total) to achieve these findings. The study identified high energy saving potential for interior insulation materials when an area is heated intermittently, although a certain level of comfort was simultaneously sacrificed. This loss of comfort is considered unacceptably high in certain areas with high operating temperatures (bathrooms) and short periods of use. Heating is not advisable in these cases unless it is supervised. An insulation variant was discovered for all of the other tested usage scenarios that permits intermittent heating and only subjects residents to an acceptable level of discomfort. High density interior insulation (8cm) on the outer walls was found to be the most effective variant. For short periods of time in a room, the effectiveness of heating can be improved by additional interior insulation of the interior walls. In order to ensure the time taken to heat a room remains acceptable, the temperature when the room is vacant should not fall below 2-3 °C under the target temperature when the room is occupied.

Overall, apartments achieved an average energy-saving potential of 64 % in comparison to unrenovated and continuously heated old buildings. 49 % thereof is attributable to improved energy efficiency (interior insulation) and 15 % to improved energy use (intermittent heating).

CO_2 savings potentials achieved by roof renovations in Germany

This study commissioned by the Bundesverband der Deutschen Ziegelindustrie e. V. (Federal Association of the German Brick and Tile Industry) assessed the economic, energy and climate potential that could be achieved with the renovation of pitched-roof constructions.

For the study, existing roof constructions were used as a basis for model calculations, differentiated according to building types and age, and their development was projected until 2050 in line with the timeframe for climate protection policies and taking different renovation rates into account.

Depending on the renovation rate and depth, the renovation of the existing roofs led to up to 25% potential savings for CO_2 emissions in the construction sector. Currently, in Germany, four million roofs i.e. 600 million square metres of roof surface are only fitted with minimal thermal insulation or none at all. This is particularly common in detached and semi-detached houses. Another 6.5 million roofs or 1 billion square metres only fulfil the energy requirements of the Thermal Insulation Ordinance valid from 1977 to 1984.

In order to meet the current climate policy targets, a 1.3% increase in the amount of renovation work compared to the current component-related renovation rate for roofs is required. The resulting additional costs for the renovation expenditures will not be fully compensated by the achieved energy savings. It then follows that a renovation rate of 2% will result in additional costs of approx. 1.5% compared to a renovation rate of 1.3%. If 3 % of the roof surfaces are renovated, the additional expenditure will amount to approx. 6.5 %. Provided a moderate increase in the renovation rate is achieved, the renovation of a roof is comparatively one of the most economical efficiency measures. It also entails additional economic potential in the form of positive developments on the labour market for mechanics and SMEs.

The future support of funding programmes is required to help increase the renovation rate.

CHRISTOPH SPRENGARD (FIW MÜNCHEN)

In order to continue to reinforce the positive attitude towards efficiency measures and motivate building owners to carry out renovations, the funding programmes will continue to require support in the form of public relations work and campaigns. These initiative require continued funding.

Planning sustainable buildings: Grey energy as a decisive factor for selecting the construction method?

The climate policy targets set by the Federal Government include an energy standard for the construction sector to be applied to new buildings, which will be required to meet the standards set for low-energy buildings pursuant to EU directives.

In future, the new German Energy Act for Buildings (GEG) will provide the legal framework for this. When the definition of future requirements is discussed, attention is often paid to the increasing significance of grey energy in line with the increasing energy standards. Grey energy is the amount of energy required for the upstream process chains, from the extraction and processing of raw materials to the production and transportation of a product.

FLORIAN KAGERER (FIW MÜNCHEN)

Whilst the total primary energy requirements of new buildings continues to decline, the share of grey energy in relation to the primary energy requirements for user electricity and operation is constantly on the rise.

When the definition of future requirements is discussed, attention is often paid to the increasing significance of grey energy in line with the increasing energy standards. Grey energy is the amount of energy required for the upstream processes, from the extraction of raw materials to the production, processing, disposal and transportation of a product and resources. The study conducted by FIW München calculated the expenditure of grey energy for a range of different exterior wall systems in solid and wooden constructions and a range of thermal qualities on the basis of a typical single family house.

The findings are as follows:

- Over the life cycle, the energy savings significantly exceed the use of grey energy.
- The operation of the building is the decisive factor and determines the overall balance.
- The construction method only has limited influence on efficiency.
- The calculation of grey energy is too complex.

The development of new super-insulating insulation materials for high temperatures and obstacles in characterising their performance

A new class of highly porous materials has been developed to provide superior thermal and acoustic insulation to the insulation materials commonly used today.

This new material developed by researchers is aerogel, an unparalleled solid insulation material. Aerogels consist of a nanostructured network structure with extremely low densities, porousness of up to 99.95% and large internal surfaces. This results in notable physical properties, i.e. extremely low thermal conductivity and low sound velocity with high optical transparency. Aerogels have created new opportunities for a wide range of applications due to their ability to withstand high temperatures up to 850 degrees Celcius, and even higher in certain cases. Granular materials and fibre-reinforced aerogels are both currently on the market. These are used for pipeline insulation in addition to applications in the construction sector. The current focus of research in the field of insulation materials lies in the further development of materials with a focus on green chemistry and upscaling in order to meet the current market demand. The lecture will introduce the material class and discuss the obstacles for the characterisation of “high-tech” materials.

UNIV. PROF. DR. RER. NAT. BARBARA MILOW – DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT E.V. (DLR)

Building authority requirements for thermal insulation materials outside the building waterproofing

According to DIN 4108 Part 2 Section 5.2.2, thermal insulation layers outside the building waterproofing may not be used to calculate the heat requirements of a building. However, there are two exceptions to this rule: Firstly, a thermal insulation system for non-load-bearing perimeter insulation with XPS or cellular glass in the case of non-pressing groundwater, and secondly an insulation system with XPS as a gravelled inverted roof. Other applications (e.g. load-bearing insulation layers, pressing groundwater) or deviating insulation systems (e.g. green roof, parking level, multi-layer installations) with XPS or cellular glass must be specified in individual "building regulations". This also applies to all other thermal insulation materials used outside the building waterproofing (e.g. EPS, PU).

Following the amendment of the State Building Codes in 2016, non-standardised applications of thermal insulation materials with a European product standard (hEN) can now be regulated by general type approvals (aBG). This can take place on the basis of the declaration of performance of hEN if the construction product is adequately described therein. As this is often not the case for applications outside of building waterproofing, general type approvals for insulation systems with XPS and cellular glass have been issued since 2018, usually in conjunction with a European Technical Assessment (ETA/ETB), which contains the definitions of additional product properties of the thermal insulation materials or product properties that deviate from hEN. Corresponding ETAs were prepared as a basis for perimeter insulation systems with EPS in spring 2019. General type approvals on the basis of these ETAs are expected to be announced in the near future.

The change in the regulations for thermal insulation materials for external applications from general building authority approvals to general type approvals has entailed a range of substantial changes for manufacturers:

1. Regular submission of test certificates to DIBt, planners and customers only within the framework of the German Chamber of Auditors
2. Responsibility for compliance with the ETA control plan lies with the manufacturer (previously with the surveillance body)

CLAUS KARRER (FIW MÜNCHEN)

3. Obligation to provide proof of product quality to DIBt in the case of extension/amendment of the General Type Certification (aBG)
4. Ü-certificate no longer required to verify compliance with the product properties
5. Ü-mark no longer required as quality mark

The certification schemes provided by FIW München for thermal insulation materials in insulation systems outside of the building waterproofing enable manufacturers to largely offset these disadvantages: Regular test certificates, which provide a summary for verification when extending the type approval, are produced by the surveillance body through the coordination of the scope of testing within the scope of the certification schemes and the requirements of the control plans for the ETAs. In addition to providing verification of the certified product characteristics, the certification body can also assess these characteristics with regard to national or European regulatory documents. This leads to the issuance of certificates that establish reliable compliance with the requirements of a type approval, an ETA or with applications according to DIN 4108-10. As a Europe-wide registered warranty mark (certification mark), a Q mark demonstrates the reliability of the certified products in special applications outside of building waterproofing.

Flexible certification systems: From standardised products to national implementation

Following the implementation of the ECJ ruling C-100/13, only select properties are subject to the requirement for regular auditing and certification according to System 1. As the German Ü mark, which previously regulated usability, has also been dropped, many manufacturers print private-law quality marks such as the KEYMARK or the Q mark from ÜGPU on the label of their insulation materials.

As a rule, these quality marks only provide information on whether the properties of the insulation materials have been tested and certified. The ÜGPU Q mark also includes an application certificate, which states the applications the insulation material can be used for.

Users and planners prefer to have certificates that attest both the properties and the applicability of the insulation material for specific applications and insulation systems.

WOLFGANG ALBRECHT (FIW MÜNCHEN)

Therefore, FIW München has developed so-called Basic Certification Agreements/Basic Contracts, which regulate the basic principles and the certification process. These contracts regulate:

- The mandatory certification according to system 1 of the EN standards or ETAs
- The voluntary product certification according to EN standards or ETAs
- The certification of suitability for the application

In the certification directory (annex to the certification agreement), various significant regulations on practical implementation can be regulated in detail, such as

- compulsory certification schemes
- voluntary certification schemes
- which body is responsible for performing the audits
- which testing institute should be involved
- which certificates should be issued on a regular basis

This annex can be easily and flexibly adapted to suit the customer's requirements and is sent to the customer by email as a PDF document and is therefore valid.

It was also discovered that many customers would like the quality to be visible on the label with a mark. We have developed the "Tested Quality Insulation" quality mark to fulfil this requirement. The mark is currently protected as a mark at the European Union Intellectual Property Office (EUIPO).

Manufacturers can also supplement the mark with information regarding the applications the insulation material is suitable for. FIW München ensures that only appropriate and officially recognised certification schemes are included. In summary, FIW München offers an instrument that is very flexible and complies with EU regulations to verify the quality of an insulation material and above all its applicability in Germany and highlight this quality to the end customer.

From mandate to market launch: How does European insulation standardisation work?

Standardisation has undergone a significant transformation since the introduction of the “New Approach” in 1985 with the aim of harmonising the European internal market. Standardisation was consequently elevated from a national to European level. National standards have since lost their significance and harmonised EN standards are much more common.

They are published in the EU Official Journal (OJEU) and are therefore immediately valid in all EU member states. The harmonised EN standards for construction products are based on a standardisation mandate under the umbrella of the EU Construction Products Regulation (EU CPR), which the EU Commission issues to the standardisation organisation CEN. The technical committee CEN/TC 88 is responsible for preparing the product standards for insulation materials. These technical specifications must be used as a basis for the CE marking of products by manufacturers of insulation products. The construction product is then deemed tradable on the market and suitable for use in construction works as the result of the proven conformity of its performance from a declaration of performance. However, manufacturers are still required to separately submit the fitness for use according to a defined purpose in the respective Member State. Since 2017, only approximately 11 % of the completed EN standards have been published in the EU Official Journal, meaning they have therefore not yet been harmonised and CE marking is not possible on the basis of these documents. The standardisation work for insulation materials has consequently been largely blocked. The main reason for this is the non-conformity identified through the application of an outdated mandate by the Commission concerning the EU Construction Products Regulation.

In order to remove this blockade, the EU Commission has initiated the introduction of a new standardisation request in 2019. A multi-stage adoption and commentary process involving stakeholders, CEN, the Commission and EU Member States aims to establish the basis for the standardisation of insulation products over the coming decades. The insulation products,

ROLAND SCHREINER (FIW MÜNCHEN)

their delivery forms and possible applications, their essential characteristics in relation to the basic requirements for construction works in accordance with the EU CPR as well as the classes and threshold values required for this purpose will be recorded in detail in the new mandate. Particular attention will certainly be paid to the newly added basic requirement BWR 7 for the sustainable use of natural resources.

The industry has therefore been called upon to play an active role in the determination of the required essential characteristics of insulation materials in order to offer unrestrictedly usable construction products on the market in the future through the application of a precisely formulated standardisation request.


Amtszeit alles daran setzen, dass die
Bundes-regierung ihr Etappenziel
schaffe, den deutschen CO2-Ausstoß
bis 2030 um 55 Prozent zu reduzieren.
Nach ihrem persönlichen Beitrag
gefragt, betonte Merkel, dass sie nicht
die Hände in den Schoß lege: „Mein
Haus habe ich der Wärmedämmung
unterworfen.““
Quelle: Der Tagesspiegel, Mi. 15.05.2019


FIW Forschungstag 2019
Wärmewende in der Praxis


FIW Forschungstag 2019

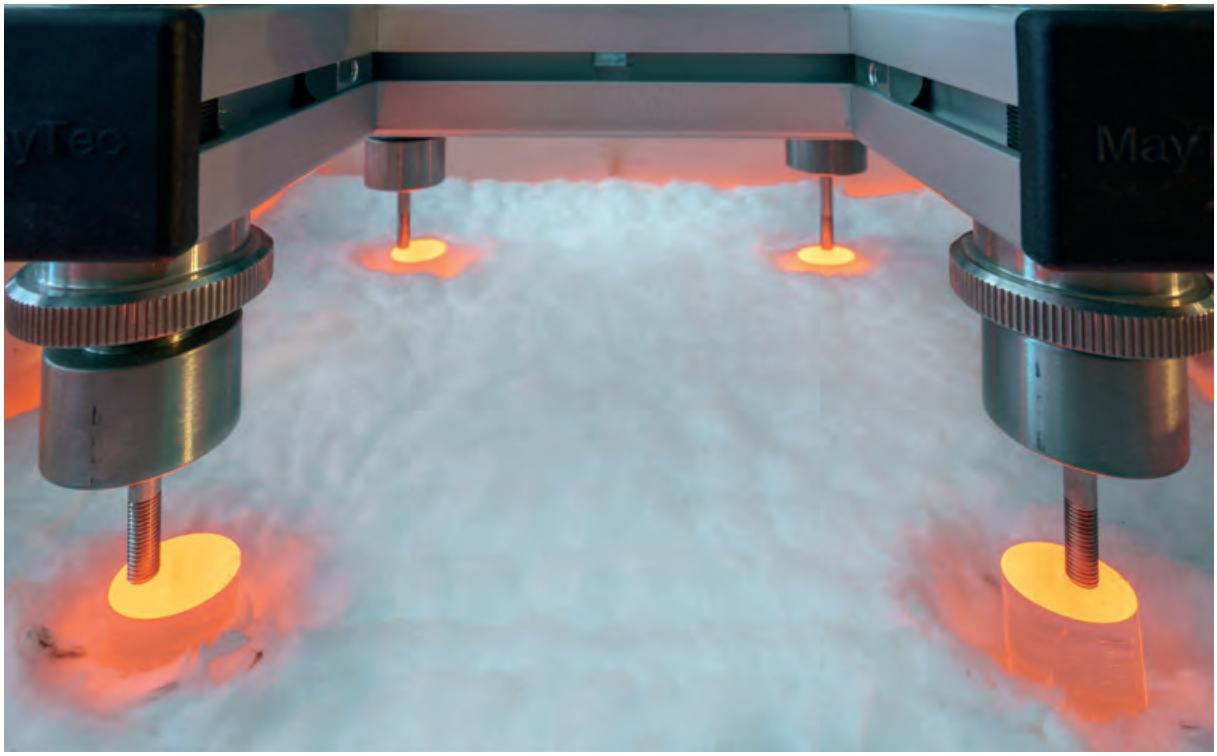
8 Quality management

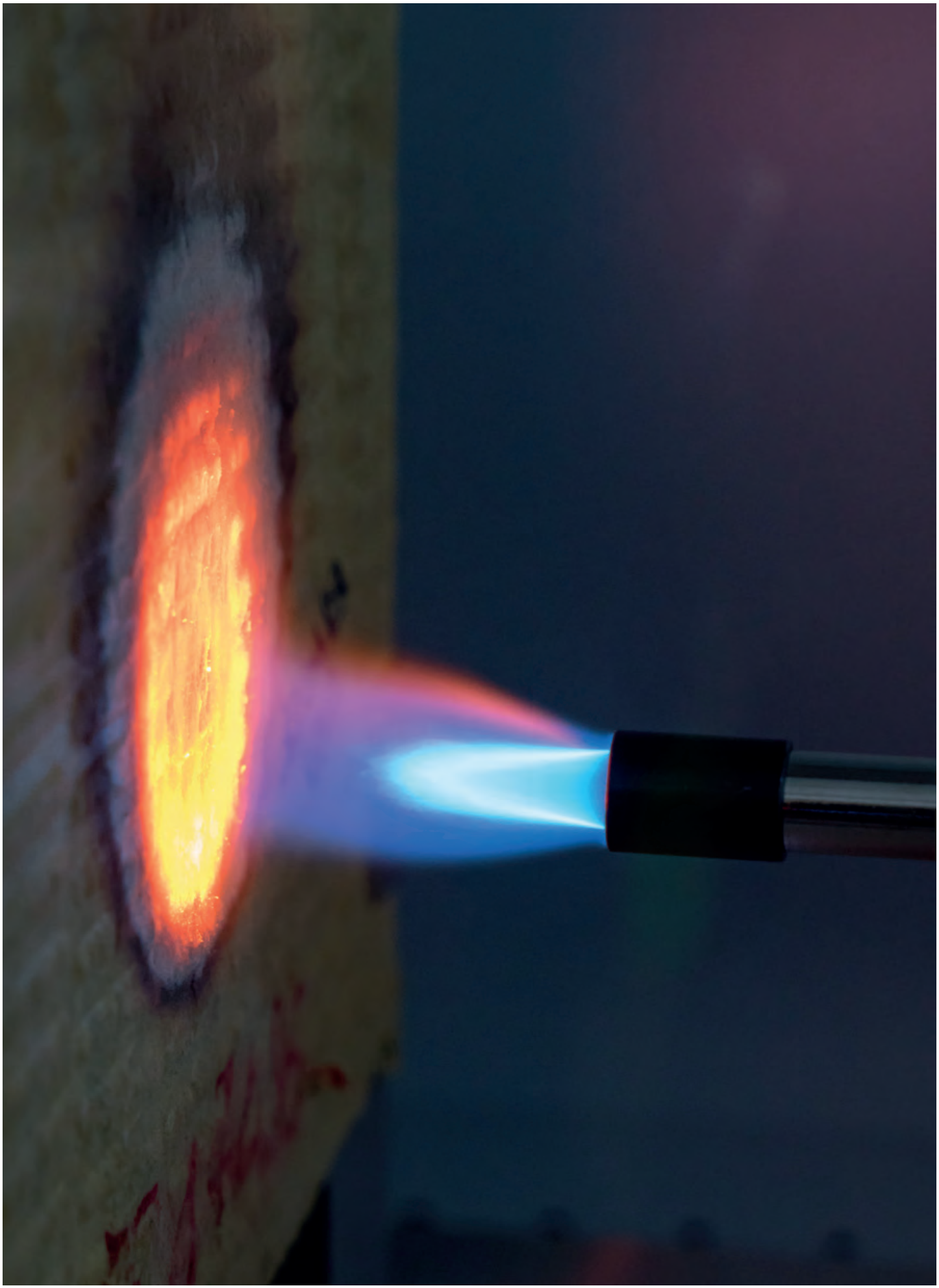
“Risk less, yet try new, daring things”

This was the motto for the quality management changes that occurred at FIW München in 2019.

The successful adaptation of the quality management of the testing laboratory to the new requirements of DIN EN ISO/IEC 17025:2017 has helped to ensure the accreditation and notification of FIW München as a testing laboratory for thermal insulation materials and thermal insulation systems. As part of the changes, a new concept for quality management documents and their nomenclature was implemented in addition to the introduction of risk-based approaches. Other elements of risk minimisation include regular analysis of impartiality and participation in round robin and suitability tests with national and international partners.

New tests qualified for accreditation and were successfully introduced thanks to the work of our skilled colleagues in the laboratory. Tests to determine the non-combustibility of construction products according to EN ISO 1182 and also to determine the heat of combustion for construction products according to EN ISO 1716 now feature amongst the extensive range of tests for thermal insulation materials offered by FIW München.





9 FIW München events and publications

Events, seminars and trade fairs

Seminars

FIW München successfully hosted seminars on the topic of thermal insulation for technical installations for a number of years. In addition to the training courses for insulation manufacturers held at the institute, the contents can also be individually adapted to meet the demands and requirements of customers. The training courses cover the basics of heat transport and heat transfer as well as calculations and application examples.

As a result of the long-term rise in energy prices, the impact of moisture and corrosion on the calculations of insulation and economic efficiency are clearly presented to the training participants. Last but not least, the topic is rounded off by an informative look at the applicable standards, regulations, worksheet and product specifications.

Tipcheck 2019

The European Industrial Insulation Foundation (EiiF) provides a method to calculate the optimisation potential of industrial plants: The TIPCHECK (Technical Insulation Performance Check) is committed to the target of increasing ecological and economical operation. The TIPCHECK is conducted by specially trained and certified TIPCHECK engineers and comprises the following steps

- Stocktaking
- Analysis
- Consultation
- Determination of measures

During this process, plant components are photographed using a thermal imaging camera, which provides information concerning the weak points in the existing insulation. Detailed analyses then form the basis for a comprehensive consultation, which, in addition to specific technical measures, also sheds light on cost-relevant aspects. Increasing the efficiency of insulation not only saves energy and money and reduces emissions, it also has a positive impact on process monitoring and workplace safety.

EiiF held its TIPCHECK courses at FIW München once again in 2019.

In addition to providing a location, the institute also supplemented the courses with practical exercises for calculating thermal insulation.

The extensive stock of insulation material samples at FIW München helped participants gain an accessible insight into materials science. FIW München used its own test equipment to train participants in measuring temperatures in line with various measuring principles.

Contact person: Karin Wiesemeyer

Training: Introduction to calculations - designing insulation

Training courses based on VDI 2055 Part 1 “Thermal Insulation of Technical Installations - Calculation Basis” can be held at FIW München or your company premises upon request.

Contact person: Roland Schreiner

Teaching and lectures

Prof. Dr.-Ing. Andreas H. Holm

- "Fundamentals of building physics", Munich University of Applied Sciences
- "Energy Performance of Buildings" as part of the international master's programme "Building Sustainability", Technical University Berlin
- "Dynamic hygric-thermal behaviour of buildings" as part of the master's programme in civil and environmental engineering, Technical University Munich

Publications

- Cucchi, C.; Lorenzati, A.; Treml, S.; Sprengard, C.; Perino, M.: "Standard-based analysis of measurement uncertainty for the determination of thermal conductivity of super-insulating materials", in: "Sustainability in Energy and Buildings", Springer, 2019
- Treml, S.; Regauer, S.; Kokolsky, C.; Sprengard, C.: "Impact of artificial ageing on mechanical and hygrothermal properties of Advanced Porous Materials (APM) for buildings", in: Conference Proceedings of the International Vacuum Insulation Symposium Kyoto, Japan, 2019
- Lohr, K.; Kokolsky, C.; Treml, S.; Sprengard, C.: "Increase of thermal conductivity of VIPs with fumed silica cores in relation to absorbed moisture – measurements and hygrothermal simulations", in: Conference Proceedings of the International Vacuum Insulation Symposium Kyoto, Japan, 2019
- Treml, S., Engelhardt, M., Windeisen-Holzhauser, E., Sprengard, C., Richter, K.: "Wood fibre boards as core material for vacuum insulation panels" Posterbeitrag, in: Conference Proceedings of the International Vacuum Insulation Symposium Kyoto, Japan, 2019
- Alberti, R.: "Heat transfer coefficient/resistance", in: Isolierer.net
- Alberti, R.: "Latest developments from the AGI – AGI working documents Q 139", in: isolierer.net
- Simon, H., Engelhardt, M.: "Thermal bridge effect of ETICS anchors", in: B+B Bauen im Bestand, April 2019
- Gonçalves M., Resalati S., Maddock S., Sprengard C., Serra C., Simões N.: "A cost-optimal sensitivity analysis of VIPs application in buildings.", in: Eco-Architecture 2018: 7th International Conference on Harmonisation between Architecture and Nature, New Forest, United Kingdom, 2nd-4th October 2018.
- Schreiner, R.: "INSULATION VDI/KEYMARK – European quality assurance of insulation materials", in: isolierer.net, 1/2019
- Schreiner, R.: "Operational thermal conductivity – VDI 2055 part 1", in: isolierer.net, 2/2019
- Schreiner, R.: "Insulation VDI/KEYMARK – EiiF takes on management of the secretariat", in: TI Technische Isolierung, Praxiswissen für Wärme-, Kälte-, Schall- und Brandschutz, 3rd November 2019 edition
- Albrecht, W.: "Recycling of thermal insulation materials", in: Bauphysikkalender, 2019
- Treml, S., Engelhardt, M., Sprengard, C., Butko, W.: "Determination of the internal pressure of vacuum insulation panels with the envelope lift-off technique – methods for analysing test data", in: Energy and Buildings, Volume 184, 1st February 2019

Presentations

Prof. Dr.-Ing. Andreas H. Holm

- "The energy revolution in the construction sector with a particular focus on detached and semi-detached houses" - winter seminar of the FA. Rotex on 30th January 2019 in Hannover
- "The new building energy law (GEG)" - GRE fireplace evening on 2nd February 2019 in Berlin
- "The new building energy law (GEG) – requirements, changes, implementations and profitability analyses" – Masonry Days 2019 on 12th February 2019 in Dachau, 13th February 2019 in Memmingen and 14th February 2019 in Ulm
- "The new building energy law (GEG) - requirements, changes, implementation and profitability analyses" - Lebensraum Ziegel on 27th February 2019 in Denkendorf
- "Grey energy of residential buildings with a low energy standard" – KfW-DEN-GRE Forum 2019 on 3rd April 2019 in Frankfurt
- "How the building envelope contributes to the heat revolution" – Berlin Energy Days on 21st May 2019 in Berlin
- "How the building envelope contributes to the heat revolution" – Network meeting on renewable energies and increased energy efficiency on 13th November 2019 in Röhrnbach
- "Necessary Changes in the Residential Building Sector to Achieve the Climate Protection Aims for 2030/2050 in Germany" – 2019 Buildings XIV International Conference am 10th December 2019 in Clearwater, USA
- "Workshop: Energy Efficient Buildings: Economy vs. Ecology" – 2019 Buildings XIV International Conference on 8th December 2019 in Clearwater, USA

Christoph Sprengard

- "CO_2 savings potential through the renovation of roofs in Germany" at the research day hosted by FIW München on 23rd May 2019 in Munich
- "Impact of artificial ageing on mechanical and hygrothermal properties of Advanced Porous Materials (APM) for buildings" at the International Vacuum Insulation Symposium on 19th September 2019 in Kyoto, Japan
- "Increase of thermal conductivity of VIPs with fumed silica cores in relation to absorbed moisture – measurements and hygrothermal simulations" at the International Vacuum Insulation Symposium on 20th September 2019 in Kyoto, Japan

Wolfgang Albrecht

- "Quality assurance for EPS under the current boundary conditions" – Symposium on EPS particle foam on 14th May 2019 in Würzburg

Roland Schreiner

- "The new KEYMARK scheme for all Thermal Insulation", KEYMARK Workshop 2019 – The Exchange of Experience, Brussels, 16th October 2019

Claus Karrer

- "Which building regulations exist in the field of thermal insulation and what can voluntary schemes achieve in practice?" FACHFORUM "Zukunft Bauen 03" hosted by BASF SE and Sto SE on 28th March 2019 in Ludwigshafen

Stefan Sieber

- "Long-term behaviour of EPS as perimeter insulation in theory and practice"; Research Day 2019 at the Haus der Bayerischen Wirtschaft on 23rd May 2019
- Assessment and Verification of Constancy of Performance (AVCP) – how will it work tomorrow? at the EAE Workshop in Gräfelfing on 28th June 2019

Florian Kagerer

- The grey energy of single-family houses with a low energy building standard - Bauzentrum München on 2nd July 2019
- The grey energy of residential building – Allgäu Energy Day on 14th August 2019

Chiara Cucchi

- Standard-based analysis of measurement uncertainty for the determination of thermal conductivity of super-insulating materials, 11th International Conference on Sustainability in Energy and Buildings (SEB 19) in Budapest on 5th July 2019

FIW München in the press

Master theses

The following master's theses were supervised in cooperation with the Technical University of Munich (TUM) and the Munich University of Applied Sciences in 2019. All 3 were chaired at the Faculty of Civil Engineering Geo Environment by the Chair of Building Physics, Prof. Dr.-Ing. Dipl.-Phys. Klaus Peter Sedlbauer.

Wolfgang Schmidt
The determination of the thermal conductivity of moist materials – investigation on the application of ISO 16957 in insulation testing, master's thesis in environmental engineering

Xingyun Wang
Case Study: Economic Applicability Analysis of Vacuum Insulation Panels in Europe – In the Framework of INNOVIP Project – Long–term analysis of economic performance of classic insulation materials and novel vacuum insulation panels with their effect on indoor rentable area, master's thesis in energy-efficient and sustainable construction

Kerstin Lohr
Investigations on the thermal conductivity of vacuum insulation panels with silica cores as a function of moisture content, master's thesis in civil engineering

Participation in podium discussions

Prof. Dr.-Ing. Andreas H. Holm

- "RE:frame energy efficiency - new inspiration ideas for climate-friendly buildings" – Bau 2019 on 16th January 2019. Organised by the Federal Ministry of the Interior, Building and Community

- "Yesterday. Today. Tomorrow – Academic answers to political questions" – Berlin energy days on 21st May 2019

10 Workshop

European harmonized technical specification and national regulation – today and tomorrow

A workshop on the status of regulations for external thermal insulation composite systems was held on 28th June 2019 at the FIW München in cooperation with the European Association for ETICS (EAE). Ralf Pasker (Managing Director of EAE) and Stefan Sieber (FIW München) welcomed 19 participants from eight different countries to the institute.

In addition to the two hosts, contributions were also made by:

- Dr. Thomas Lohmann (Chairman of the standardisation group for ETICS (TC88/WG18)
- Vaclav Hadrava (Consulab - independent Czech expert on regulations and consultant on quality control and certification systems)
- Dr. Clemens Hecht (Speaker of the ARGE Quality Group for Thermal Insulation Systems and Advisory Board of the Austrian Federal Economic Chamber for the Plaster and Mortar Industry)

Ralf Pasker opened the talks with an insight into the current regulatory status of ETICS, explaining the background of the European regulations for construction products and finishing with an outlook on the projected regulatory changes for the coming years. Dr. Thomas Lohmann focused on the current draft standard for ETICS (prEN 17237), whilst Stefan Sieber presented a new approach towards quality control (AVCP). Vaclav Hadrava and Dr. Clemens Hecht delved into national regulations for the application of ETICS. Vaclav Hadrava rounded off his contribution with the basic principles of the European regulatory concept. He also emphasised the division of tasks between harmonised regulation and national implementation. Finally, the managing director of FIW München Prof. Dr.-Ing. Andreas Holm provided a commentary on the current state of standardisation from his perspective as the chairman of TC 88.

In the coming years, the relevant market participants and national regulatory authorities will be required to create the conditions for the introduction of the new standardisation regulations in order to make the transition as smooth as possible. In particular, national application rules for ETICS products according to the upcoming prEN 17237 still need to be created and observed by market participants. This will require increased attention and qualified opinions in the near future.

In addition to the lectures, both participants and speakers were given sufficient time to engage in discussions and provide in-depth comments. They were also treated to a short tour on the institute during the lunch break.

The event was very well received by the participants.

FIW München will continue to support the projected new regulations on ETICS and offer support in the implementation thereof through exchanges of information and corresponding events. Speakers and lecture titles from the event can be viewed at
http://fiw-event.de/eae-workshop-2019.


WÄRMEDÄMMSYSTEME
(Baustoffliste ÖE) via Austrian Institute of Construction Engineering (OIB)


Changes to
prEN17237:2018
Main changes to „december" document
Meaning of „the product"
ETICS (system) to ETICS (kit)
Grouping to variants
Scope
More precise
Change of thresholds for components to limits
Thresholds are no limits


FIW
München

11 Internal updates

Cycling for the environment and for a good cause

THE MAJORITY OF FIW CYCLING EMPLOYEES

It started as a competition amongst budding athletes at FIW München and has now evolved into a widespread campaign at the institute with half of all employees now involved: The calculation of the distance cycled to work.

A grand total of 47,706 km was achieved in 2019. The freely accessible “cyclist list” has increased the competitive edge amongst certain employees. In 2019, victory went to a employee who cycled 6,238 km to work in 170 days. Another 7 employees braved the elements to complete over 150 cycling days in 2019, with another 8 cycling to work on over 100 days. The employee with the longest journey to work was the head of the institute, who similarly traded his car for a racing bike during the summer months. With a total of 117 km for the outward and return journey, the distance-wise runner-up was only just behind the winner, covering this distance in 17 days in 2019. All of the participants are planning on increasing the total mileage in 2020 to achieve a new best value on an individual and institute-wide level.

They aren’t just motivated by the competitiveness and target of achieving as many kilometers as possible and reduce their carbon footprint with manpower. The institute’s management also honours the commitment and is committed to achieving a healthier lifestyle, sustainable climate protection and a better future. As a result of donating 2500 trees as part of the children and youth initiative Plant-for-the-Planet in 2016 and supporting of the project “Hoffnungsstark - Umweltbildung gegen die Ausgrenzung Jugendlicher” from the “Zentrum für Umwelt und Kultur Benediktbeuern” in 2017 and the Energieschule München (Munich Energy School) project, in 2019 one euro for every tenth kilometre cycled went to the Regens-Wagner-Foundation Dillingen to its facilities in Holzhausen, as well as to other charitable institutions.

Company B2Run

F.L.T.R., BACK: KERSTIN LOHR, STEFAN KUTSCHERA, WOLFGANG ALBRECHT, MARTIN LAUFF, ANGÉLA JAKAB, TOBIAS TIMMERMANNS, CHRISTOPHER FIEGEL, ANDREAS HOLM.
FRONT: WOLFGANG MOOSBURGER, CAROLIN KOKOLSKY, FELIX BASEL, SUSANNE REGAUER, GERALD COY, KERSTIN ZEHENTNER

15 FIW keen runners embarked on the 6.1 km run around the Olympic Stadium on 16th July 2019. They ran alongside 30,000 other athletes with a strong focus on the shared experience taking precedence over the competitive atmosphere.

That being said, everyone was gripped by competition fever nonetheless. In the wake of our triathlete, almost all of the FIW runners achieved a personal best time, and had the opportunity to discuss their running times, ways to improve and how they found the race in detail in the Villa Dante.

There is a strong level of enthusiasm for sports amongst colleagues at the institute. In addition to regular running events, several sports groups hold events on a weekly basis - some on the premises of FIW München. The sports fever is certainly contagious; colleagues are often inspired by other colleagues reaching their personal targets. As a result of this, another group of runners has been preparing to enter the company run in 2020 since 2019.

Employees participate in the pro-climate demonstration

The current wave of pro-climate demonstrations sweeping the nation reached Munich on 20th September 2019.
The demonstration brought together all corners of society, from pupils and students to an impressive number of companies and leading personalities. It evoked a strong message that climate change is not just an international cause, but a national one too.

The Federal Government has acknowledged this fact by signing the Paris Climate Convention and placing climate protection at the heart of its policies.

Demonstrations such as “Fridays for Future” have given impetus and made significate contributions to the fight against climate change.

F.L.T.R.: ALEXANDER SCHNEIDER, ANDREAS SEEFELDER, CAROLIN KOKOLSKY, LUKAS BERGER, MARTIN LAUFF, STEFAN KUTSCHERA, KERSTIN LOHR, FELIX BASEL, ROLAND KÜMMEL, SUSANNE REGAUER

FIW München continues to offer training courses

FIW München is able to offer a wide variety of personal development fields thanks to its wide range of products and services. From gaining technical expertise and process know-how to expanding the spectrum of methods, research activities, experience in project management and acquisition, and the establishment of networks, e.g. through work in standards committees.
Starting a position at FIW München is as varied as it is challenging: Whether as an intern, during your studies, as a guest researcher, through direct employment or starting an apprenticeship. Internal training courses are used to prepare the skilled new technical employees for their responsibilities and specialised work at FIW München.
In addition to manufacturing, servicing and maintaining our physical apparatus and measuring equipment, the evaluation and recording of physical measurements is a key part of the daily routine of our physics laboratory assistants. You will work closely with our engineers in testing and certification as well as in research to develop new testing and measuring methods, for example.

FIW München has trained primarily physics laboratory technicians who graduated vocational school near the Bavarian border in Selb for several decades. Another employee started at FIW München directly after her graduation in 2019: Since then, Melanie Jähne has worked for us as part of Christoph Sprengard’s research team.
Maurice Ewen has been employed as a trainee physics laboratory assistant at FIW München since 1st October 2019.

Legal notice

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