Building sustainability

Navigating the jungle of sustainability
Technical insulation for sustainable buildings



Image Source: Shutterstock/ alphaspirit - https://www.shutterstock.com/image-photo/sunny-day-project-homeGreater value is being placed on building sustainably and all of the certifications that it entails. Incorporating aspects of sustainability into building planning often poses major challenges. With all of the various certificates and labels, each signifying something different, it can be difficult to keep track of which construction materials are best used for what and to proceed efficiently. Ramona Eisensteger (Building Material Scout GmbH) has some tips that will help.

The technical insulation plays a crucial role in ensuring the final result is a "green building". Dr Jürgen Weidinger (Kaimann GmbH) explains what to keep in mind.



Navigating the jungle of Sustainability

The number of certified and registered LEED projects around the world has increased from 1,200 in 2008 to over 95,000 in 2018. This increase was accompanied by a growing number of DGNB and BREEAM certificates.

Alongside the objective of protecting, not impeding, the global and local environment with the construction of a building, builders see considerable advantages in additional planning and quality assurance for their building and the value appreciation of their property. Simultaneously, utility costs can be reduced by using water-saving taps and energy-efficient technology. Certificates can also be awarded on the basis of health benefits and an increased quality of life for the occupants.

All green-building systems are founded upon a holistic approach to the building by taking its entire life cycle into consideration. This holistic approach is based on the three pillars of sustainability: economy, ecology and social welfare. Additionally, the planning, technology and location of the building are evaluated, taking into account a wide range of criteria, including economic criteria like life-cycle costs and the value retention of a property. Sociocultural factors are also analysed, such as accessibility; thermal, acoustic and visual comfort; and interior air quality. Ecological aspects include the building's environmental footprint, the use of renewable energies and regenerative, emission-free raw materials, as well as maintenance, repairs and waste management. Up to 30 per cent of the final certification result in a DGNB, LEED and BREEAM system depends on the selection of construction materials. Still, it is difficult for planners to fully tap this potential.

Diverse material certifications are necessary

Planners and construction firms are well aware of the challenges posed by many of the certification requirements in DGNB, LEED and BREEAM projects, for example energy efficiency, thermal comfort and good acoustics. Material challenges, on the other hand, can be a bit more elusive. The planning and execution criteria of the relevant certifications are quite diverse.

DGNB, LEED and BREEAM require more than just compliance with statutory standards in Germany and Europe, but rather cover everything from VOC content in adhesives, sealants and coatings to certifications attesting to contaminants and emissions in insulation, flooring, wooden products and more.

Recycling and regionality are also evaluated, and certification is to be obtained by a recognised product label, like Cradle to Cradle[®], Blue Angel, natureplus and additional environmental product declarations (LCA) and manufacturer sustainability reports.

Requirements are continuously updated

The sheer variety of product labels, building certificates and material declarations can be quite confusing, making it nearly impossible for builders and planners to keep sight of everything. These certification systems are regularly updated, and new ones are constantly being introduced. Material requirements are also affected. Product manufacturers are bombarded by various requests for certificates and declarations, so it's important that they always keep their product data up to date. As a manufacturer or planner, it's not enough to have obtained all of the necessary certificates at one point. To make matters even more complex, there has recently been a great demand for product-related BIM objects and data on environmental footprint. For planners and construction firms, this means spending considerably more time on researching products and obtaining documentation.

Challenges for planners and architects

DGNB auditors, LEED contacts and BREEAM assessors responsible for ensuring a certification is warranted for the finished project have long been attempting to stay on top of the situation by integrating ecological construction criteria in general preliminary notes contained in the tender documents.

What they don't realise, though, is that construction firms and even product manufacturers don't always have the information necessary to meet the certification criteria. As a result, many DGNB, LEED and BREEAM aspects are overlooked from the outset, and possible points for the high quality and distinction of a product that otherwise would have been easy to obtain are thus forfeited.

It is then common to discover at the lastpossible minute that products planned for the project do not comply with these evaluation criteria, thus requiring timeconsuming research on alternative products after the fact or, if conceptional changes need to be made, leading to additional expenses.

Products that are not verified can even jeopardise the certification objective.

Therefore, to secure the necessary material and product quality, it's important to find suitable products early on in the planning stages for green building projects.



Building Material Scout finally enables planning certainty!

The planning team is then faced with the challenge of implementing the required sustainability aspects in keeping with industry norms. To do this, however, they will need a lot of detailed information and a high level of ecological expertise on complex construction-related issues. The information necessary for auditing ecological construction products can be found in various data sheets, such as safety data sheets, technical data sheets or certificates, manufacturers' websites, eco-label databases and other platforms. However, this information is often insufficient, with the only way of obtaining the correct information being to contact the manufacturer directly.

In light of the precarious position many builders, planners and construction firms find themselves in when realising projects, it can be helpful for the manufacturer to provide the necessary certificates in the form of a sustainability data sheet, for example. This would make it much easier to meet the required criteria.

Planning with Building Material Scout

Building Material Scout provides convenient access to healthy and sustainable materials. By doing so, it enables greater planning security when selecting products and obtaining documentation.

At building-material-<u>scout</u>.com, architects, planners, builders, investors, auditors and contractors – as well as occupants and operators of real estate – will find all of the necessary information for their green building in one place.

Building Material Scout evaluates and structures material-related information, making it easier to find the right products. Many advanced search options are available so that users can filter the results according to aspects like ecological and healthy construction requirements, eco-labels and green building features. After successfully finding the right products, the user can then save them in the planning tool and directly assign them to his or her projects, with or without building information modelling (BIM). This saves time and offers planning security.

Technical insulation for sustainable buildings

Protecting health and the environment while minimising utility costs: sustainability is an increasingly significant aspect in construction. It can make a significant contribution to the ecological, economic and even sociocultural dimension of sustainability. So what criteria does it need to fulfil?

Effective technical insulation can help building owners sustainably keep energy costs to a minimum. One major requirement is consistently good thermal quality and very low thermal conductivity, ensuring that cold media stays cool and warm media stays warm. The more effective this is, the less energy is required, which in turn leads to greater savings on utility costs.

Maintaining a building's thermal quality also depends on a high water-vapour diffusion resistance, which protects cooling and air-conditioning systems against condensation and pipe corrosion, in addition to thermal conductivity. If, as with synthetic rubber, the insulation has a closed-cell structure, it has automatically integrated an effective water vapour barrier throughout the entire insulation thickness. The insulation maintains its insulating capacity because it cannot become saturated with water.



Building Material Scout: How it works



(c) Kaimann GmbH Insulation with a closed-cell structure possesses an integrated water vapour barrier.

Synthetic rubber is also highly robust: if the insulation surface becomes scratched, the water vapour barrier will remain intact and the insulation will still be effective. This is because the individual cells are closed units, meaning damage to one does not mean the others will be damaged as well.



(c) Kaimann GmbH Thanks to the closed units, the performance of the insulation can be maintained even if there are damages.

These properties allow for the longest-possible service life of the technical insulation as well as minimal repair and maintenance costs for the insulation and pipelines, thus adding to the overall sustainability of a building.

Enormous savings potential

If the right technical insulation is selected and it is installed properly, the potential savings are enormous: one square metre of Kaiflex synthetic rubber insulation with a thickness of 19 mm, for example, can cut an average of around 220 kg of CO2 emissions over a period of ten years. The technical insulation thus makes a significant contribution to achieving the aims put forth by the Kyoto Protocol.

The following example demonstrates how much your pocketbook - in addition to the environment stands to benefit from thermal quality: An uninsulated DN 50 pipe consumes around 172.2 kWh of energy per metre of pipe annually. At a heating price of €0.24/kWh, this corresponds to €41.33 per metre every year. However, with 19 mm thick Kaiflex insulation, the pipe's energy consumption is reduced to just 39 kWh and the utility costs to €9.36 per metre annually, thus cutting costs by 77 per cent. This example calculation is based on an ambient temperature of 23 °C, relative humidity of 75 per cent, and fluid temperature of 6 °C within the pipe. An operation time of 6,000 hours per year was assumed.

Low-emission construction products

Walls and ceilings that are well-insulated, as is now common practice, allow for next to no exchange between the interior and exterior air. This contains not only the energy, but also any potential pollutants.

Because we spend the majority of our lives indoors, the ongoing presence of pollutants significantly increases the risk of illness, also known as but also any potential pollutants. Because we spend the majority of our lives indoors, the ongoing presence of pollutants significantly increases the risk of illness, also known as "sick building

syndrome". Symptoms associated with longer periods indoors include headaches and watery eyes. These symptoms are caused by insufficient interior hygiene. To uphold the sociocultural dimension of sustainable building construction and alleviate environmental and health burdens, the insulation used should be lowemission or emission-free, emitting no or very few volatile organic compounds (VOCs). VOCs can agitate mucous membranes and cause dizziness, lethargy or nausea.

Additional pollutants insulation must be free of include short- and mediumchain chlorinated paraffins, the flame retardant HBCD and heavy metals. Elastomer insulation meets these requirements, but even the adhesive used should be compatible.

Most adhesives contain a minimum amount of VOCs already, but when used in accordance with EMICODE, for example, they very quickly become low-emission or emission-free. This makes them suitable candidates even for silver or gold DGNB certification. Due to its unique structure, synthetic rubber offers additional health benefits: as a closed-cell insulation, it does not secrete harmful particles like dust. This goes for when it is in operation as well as for when it is being installed, if the material is cut into strips or pieces.

Environmentally friendly production

When evaluating the sustainability of a product or building, the entire life cycle has to be considered. Technical insulation should have a positive overall effect on the environment throughout its entire life cycle - including its production, which, to protect the ozone layer, should see no use of halogenated or partially halogenated agents. The amount of CO2 that the insulation saves throughout its service life thanks to its thermal guality should be many times greater than the amount CO₂ used to produce it. For example, around 1.14 kg of CO₂ is emitted for each square metre of 19 mm thick Kaiflex insulation produced. This covers every step of production, including raw-material production, transport and storage. Kaiflex insulation is usually kept installed for between 20 and 30 years. In this time, each square metre of insulation reduces CO₂ emissions by an average of 330 to 660 kg. Kaiflex insulation with a thickness of 19 mm therefore saves 290 to 580 times as much carbon dioxide during its service life than is used to produce it. Elastomer insulation thus does not contribute to the greenhouse effect, and its global warming potential (GWP) is zero.

And because it is produced without (H)CFCs or other ozone-depleting substances, its ozone depletion potential (ODP) is also ze-ro. Certifications according to ISO 9001, 14001 and 50001 attest to responsible quality, environment and energy management for companies and their customers. This al-so includes material procurement: manufacturers that require the relevant certifications from their suppliers and regularly re-view whether they uphold their ecological responsibility make a significant contribution to environmentally friendly production.

So-called environmental product declarations (EPDs) or life cycle assessments (LCAs) are two ways to holistically evaluate the environmental impact of an insulation. These take the entire life cycle of the product into account.

Secure value with certification

From thermal quality to low-emission materials and environ-mentally friendly production, there are many aspects to consider. By incorporating these requirements into the planning process and properly installing the technical insulation, it is possible to achieve a high degree of sustainability. Certification like DGNB or BREEAM can also garner the trust of the building's occupants and increase the value of the property. It therefore makes sense to select the right construction materials early on in the planning phase. This way, retroactive changes, which can be quite costly and time-consuming, can be avoided. And because the requirements can vary from one certification system to another, the specific criteria of the technical insulation for a given project and what to look out for when selecting the right kind depend on the respective certification system and the desired building classification, and must take into account the requirements of the individual property.



Kaiflex insulation saves up to 580 times more $\mathrm{CO_2}$ than is required to produce it

(c) Kaimann GmbH Kaiflex insulation material saves 580 times more CO_2 than the amount it takes to manufacture it.