SUSTAINABLE DESIGN AND INSULATION
MULTIPOR INSULATION GUIDE
We are delighted to introduce the first English edition of the Multipor Insulation Guide, which is based on the second German edition. Two years ago, we decided to dedicate an entire handbook to the subject of insulation. It proved to be the right decision, and we have since received very positive feedback. We are particularly pleased to learn that planners are using our design information and builders are putting our practical tips to the test – leading to more technically mature solutions.

With Multipor and the insulation market continuing to develop, the time has come to revisit the contents. Are the energy requirements still up-to-date? To what extent has Building Information Modelling (BIM) become an everyday tool for planners? What has happened in terms of recycling? A great deal has changed in the last two years. Change keeps us on the move. And that’s a good thing. Read the introduction in Chapter 1 to see what changes we have made.

We have developed new products such as the Multipor plinth insulation board, which is particularly relevant in view of discussions about cladding fires. New approvals granted by the German Institute for Building Technology (DIBt) now stipulate that fire barriers must be fitted round the perimeter of the plinth, the ground floor ceiling and the roof of buildings containing flammable facade insulation. However, a fire barrier does not need to be installed when using a Multipor external thermal insulation composite system. This is because with Multipor, the plinth area can be designed to create a single, non-flammable system running from the plinth to the roof. We have also added a new product to the chapter on interior insulation – Multipor compact plus interior insulation. Designed to prevent mold and minimize thermal bridges, this compact, eco-friendly, mineral-based system is particularly useful for enhancing energy performance with a low insulation thickness.

These are just two aspects that have been included in the revised planning and installation sector of the Multipor Insulation Guide. In addition, we have improved several areas and provided additional practical tips. We hope that this information-packed resource will prove useful in helping you achieve successful results in your daily work.

With our extensive experience and your skills, together we can solve all your insulation issues.
The Multipor Insulation Guide online

Always available, always up-to-date!

Full information at www.multipor.com/bim.php

The Multipor Insulation Guide containing full details of our mineral insulation systems is available online. The interactive e-book includes a range of useful functions to make it as easy as possible for you to use. It is updated at regular intervals so you can always find the latest information and data.
Multipor ceiling insulation systems

Multipor roof insulation systems

Building physics
# Contents

## The Multipor Insulation Guide

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 – 29</td>
<td>Natural insulation – we’ve got a system</td>
</tr>
<tr>
<td>30 – 37</td>
<td>Multipor insulation systems</td>
</tr>
<tr>
<td>38 – 99</td>
<td>Multipor external thermal insulation composite systems (ETICS)</td>
</tr>
<tr>
<td>40 – 42</td>
<td>3.0 Multipor external thermal insulation composite systems (ETICS)</td>
</tr>
<tr>
<td>43 – 51</td>
<td>3.1 General introduction and planning</td>
</tr>
<tr>
<td>52 – 56</td>
<td>3.2 Detail drawings for ETICS</td>
</tr>
<tr>
<td>57 – 62</td>
<td>3.3 ETICS transitions, connections and edges</td>
</tr>
<tr>
<td>63 – 71</td>
<td>3.4 Mechanical fastening of ETICS</td>
</tr>
<tr>
<td>72 – 75</td>
<td>3.5 Back-ventilated facades</td>
</tr>
<tr>
<td>76 – 81</td>
<td>3.6 Multipor facade insulation reference projects</td>
</tr>
<tr>
<td>82 – 96</td>
<td>3.7 Installing Multipor ETICS</td>
</tr>
<tr>
<td>97 – 99</td>
<td>3.8 Attaching loads to Multipor ETICS</td>
</tr>
<tr>
<td>100 – 157</td>
<td>Multipor interior insulation systems</td>
</tr>
<tr>
<td>102 – 103</td>
<td>4.1 Multipor interior insulation systems/Multipor compact plus</td>
</tr>
<tr>
<td>104 – 117</td>
<td>4.2 General introduction and planning</td>
</tr>
<tr>
<td>118 – 123</td>
<td>4.3 Detail drawings for interior insulation systems</td>
</tr>
<tr>
<td>124 – 129</td>
<td>4.4 Products and system components</td>
</tr>
<tr>
<td>130 – 142</td>
<td>4.5 Using Multipor interior insulation systems with lightweight mortar</td>
</tr>
<tr>
<td>143 – 149</td>
<td>4.6 Using Multipor interior insulation systems with clay mortar</td>
</tr>
<tr>
<td>150 – 153</td>
<td>4.7 Insulating air ducts with Multipor interior insulation systems</td>
</tr>
<tr>
<td>154 – 157</td>
<td>4.8 Attaching loads to Multipor interior insulation systems</td>
</tr>
<tr>
<td>158 – 179</td>
<td>Multipor ceiling insulation systems</td>
</tr>
<tr>
<td>160 – 165</td>
<td>5.1 General introduction and planning</td>
</tr>
<tr>
<td>166 – 168</td>
<td>5.2 Detail drawings for ceiling insulation</td>
</tr>
<tr>
<td>169 – 178</td>
<td>5.3 Installing Multipor ceiling insulation systems</td>
</tr>
<tr>
<td>178 – 179</td>
<td>5.4 Attaching loads to Multipor ceiling insulation systems</td>
</tr>
<tr>
<td>180 – 209</td>
<td>Multipor roof insulation systems</td>
</tr>
<tr>
<td>182 – 187</td>
<td>6.1 General introduction and planning</td>
</tr>
<tr>
<td>188 – 189</td>
<td>6.2 Detail drawings for flat roof insulation</td>
</tr>
<tr>
<td>190 – 191</td>
<td>6.3 Loose-laid ballasted flat roof construction</td>
</tr>
<tr>
<td>192 – 193</td>
<td>6.4 Mechanically fastened flat roof construction</td>
</tr>
<tr>
<td>194 – 195</td>
<td>6.5 Flat roof construction with rooftop parking</td>
</tr>
<tr>
<td>196 – 202</td>
<td>6.6 Installing Multipor flat roof insulation</td>
</tr>
<tr>
<td>203 – 209</td>
<td>6.7 Installing Multipor pitched roof insulation</td>
</tr>
</tbody>
</table>
7 Building physics ........................................................................................................................................... 210 – 263

7.0 Building physics ........................................................................................................................................... 212 – 213

7.1 Thermal protection ........................................................................................................................................... 214 – 243

7.1.1 Basic principles of thermal protection ........................................................................................................... 214 – 218

7.1.2 Thermal properties of components insulated with Multipor mineral insulation boards ........................................................................................................................................... 219 – 223

7.1.3 Thermal bridges ........................................................................................................................................... 224 – 227

7.1.4 Minimum requirements for thermal insulation ................................................................................................. 228 – 229

7.1.5 Indoor climate in winter and summer ........................................................................................................... 230 – 235

7.1.6 German Energy Saving Ordinance EnEV 2014 ................................................................................................. 236 – 243

7.2 Moisture control ........................................................................................................................................... 244 – 263

7.2.1 Basic principles of moisture control ........................................................................................................... 244 – 251

7.2.2 Protection against driving rain ....................................................................................................................... 252 – 253

7.2.3 Protection against ground moisture ............................................................................................................. 254 – 255

7.2.4 Protection against condensation and mold .................................................................................................. 255 – 256

7.2.5 Operating principle of interior insulation systems ........................................................................................ 257 – 263

Contact and locations ........................................................................................................................................... 264 – 265

Index .................................................................................................................................................................. 266 – 268

Referenced standards .............................................................................................................................................. 269

Legal notice .......................................................................................................................................................... 270

Full information at www.multipor.com/bim.php
Renovation, refurbishment and modernization

Multipor insulation systems provide an effective means of insulating new buildings and refurbishment projects. Thanks to the special combination of Multipor mineral insulation boards and Multipor clay mortar, the existing fabric of historic half-timbered buildings can be retained when carrying out energy-efficient refurbishments.

Multipor flat roof insulation

<table>
<thead>
<tr>
<th>General introduction and planning</th>
<th>p. 182</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detail drawings for flat roof insulation</td>
<td>p. 188</td>
</tr>
</tbody>
</table>

Processing

| Multipor flat roof insulation | p. 196 |

Flat roof

<table>
<thead>
<tr>
<th>Products and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ytong and Silka building materials *</td>
</tr>
</tbody>
</table>

Multipor ETICS external thermal insulation composite system

<table>
<thead>
<tr>
<th>General introduction and planning</th>
<th>p. 43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detail drawings for ETICS external thermal insulation composite system</td>
<td>p. 52</td>
</tr>
</tbody>
</table>

Processing

| Multipor ETICS external thermal insulation composite system | p. 82 |
Natural insulation – we’ve got a system

Multipor interior insulation system

General introduction and planning  p. 104
Detail drawings for interior insulation  p. 118

Processing
Multipor interior insulation system with lightweight mortar  p. 130
Multipor interior insulation system with clay mortar  p. 143

Multipor ceiling insulation system

General introduction and planning  p. 160
Detail drawings for Multipor ceiling insulation  p. 166

Processing
Multipor ceiling insulation system  p. 169

INTERNAL WALL

Products and processing
Ytong and Silka building materials*

* MORE INFORMATION ABOUT YTONG AUTOCLAVED AERATED CONCRETE AND SILKA CALCIUM-SILICATE BLOCKS CAN BE FOUND IN OUR CONSTRUCTION GUIDE AT www.ytong-silka.de/baubuch
New and commercial buildings require individual solutions tailored to the needs of each project. Multipor makes it possible to satisfy different energy-performance requirements with ease.

**Multipor flat roof insulation**

- **General introduction and planning** p. 182
- **Detail drawings for flat roof insulation** p. 188

**Processing**
- **Multipor flat roof insulation** p. 196

**Flat roof**

- **Products and processing**
  - Ytong and Silka building materials*

**Internal wall**

- **Products and processing**
  - Ytong and Silka building materials*

**Basement wall**

- **Products and processing**
  - Ytong and Silka building materials*
Multiplor external thermal insulation composite system

**General introduction and planning**  p. 43
Design details for ETICS external thermal insulation composite system  p. 52

**Processing**
Multiplor ETICS external thermal insulation composite system  p. 82

Multiplor pitched roof insulation

**General introduction and planning**  p. 182

**Processing**
Multiplor pitched roof insulation  p. 203

Multiplor interior insulation system

**General introduction and planning**  p. 104
Detail drawings for interior insulation  p. 118

**Processing**
Multiplor interior insulation system with lightweight mortar  p. 130

Multiplor ceiling insulation system

**General introduction and planning**  p. 160
Detail drawings for Multiplor ceiling insulation  p. 166

**Processing**
Multiplor ceiling insulation system  p. 169

MORE INFORMATION ABOUT YTONG AUTOCLAVED AERATED CONCRETE AND SILKA CALCIUM-SILICATE BLOCKS CAN BE FOUND IN OUR CONSTRUCTION GUIDE AT [www.ytong-silka.de/baubuch](http://www.ytong-silka.de/baubuch)
SYSTEM SOLUTIONS ECO-FRIENDLY SUSTAINABLE HEALTHY NATURAL MINERAL-BASED VERSATILE VAPOR-PERMEABLE NEW BUILDING INHIBITS MOULD MODERNISATION ENVIRONMENTALLY FRIENDLY ECONOMICAL SOUND INSULATION ENERGY-EFFICIENT RESOURCE-FRIENDLY COST-EFFECTIVE ECONOMICAL VAPOR-PERMEABLE CAPILLARY-ACTIVE OUTSTANDING ENVIRONMENTAL FOOTPRINT 100% RECYCLABLE VAPOR-PERMEABLE ENERGY-EFFICIENT VERSATILE SUSTAINABLE ECO-FRIENDLY ECONOMICAL
Natural insulation – we’ve got a system
ECO-FRIENDLY
SUSTAINABLE
HEALTHY

NATURAL INSULATION – WE’VE GOT A SYSTEM
MULTIPOR – SUSTAINABLE AND VERSATILE!

Multipor insulation systems are an ecological solution to sustainable construction and refurbishment. The core component of the system is the Multipor insulation board; an entirely mineral-based insulating material made from sand, lime, cement and water. The material’s special structure, which resembles the tried and tested solid construction material Ytong, gives the lightweight, easy-to-handle boards the perfect combination of key characteristics: Dimensional stability, vapor permeability and non-combustibility.

The insulation systems are used in new and existing buildings to insulate interiors, the underside of ceilings, basements and garages as well as slab, pitched and flat roofs. Multipor mineral insulation boards are also approved for use in external thermal insulation composite systems (ETICS). Thanks to their versatility, Multipor insulation systems can help meet current climate protection targets and achieve a climate-neutral building stock by 2050. With a focus on durability and value retention, the systems also appeal to public procurement bodies and investors involved in the energy-efficient refurbishment of buildings. These target groups need to know they can trust in the reliability and performance of the system across all areas – including deconstruction and disposal of building materials.

Multipor’s future-proof credentials are further enhanced by its compatibility with the new interdisciplinary, model-based process BIM (building information modelling). BIM is designed to make planning and construction workflows more efficient. But what effect does the new BIM planning process have on workflows and what new roles and responsibilities does it entail? We will address these and other issues in this second, revised edition of the Multipor Insulation Guide, now available in English.
THE UNIQUE BENEFITS OF MULTIPOR INSULATION SYSTEMS

The Multipor insulation board is an environmentally friendly, entirely mineral-based insulating material made from sand, lime, cement and water. Thanks to the special structure of the material, the lightweight, easy-to-handle boards combine several key characteristics which offer unique advantages when incorporated into the system.

**System supplier**
Multipor offers a complete insulation system for all areas of application. From facades and interiors to ceilings and roofs – we provide every system component required to carry out successful insulation work. Our extensive scope of supply includes Multipor mineral insulation boards, accessories, tools and service. This approach ensures that all system components are perfectly compatible with one another.

**No burning, no smoldering, no smoke generation**
Multipor mineral insulation boards are A-rated, non-combustible construction materials. Even at extremely high temperatures, the insulating material does not produce toxic fumes, smoke or burning droplets. So it’s not surprising that Multipor ETICS with approved finishing render have already been installed successfully in many nurseries, schools, hospitals and other public buildings. The system is also an ideal choice for multistorey residential buildings, since it fully complies with thermal insulation and fire protection requirements.

**Solid, dimensionally stable and woodpecker-proof**
Pressure-resistant Multipor ETICS mineral insulation boards perform to their strengths – whether on the facade of a school subject to high mechanical loads or in a detached house in need of refurbishment. With a comparatively high bulk density of approx. 110 kg/m³, once bonded they create a monolithic system structure which sounds like a solid wall when tapped. This prevents woodpecker damage; even rodents would have difficulty biting through the solid insulating material.
Protection against algae and fungi – without biocides
Surface moisture causes microbiological contamination. But with the Multipor ETICS, virtually no moisture arises in the first place. Rapid redrying combined with a high heat storage and water absorption capacity prevent the problem occurring in a natural way. This is because mineral systems have optimum diffusion properties. Rather than ‘sealing’ the walls completely, they can absorb and re-release moisture. This automatically creates a stable temperature and moisture balance. Unlike many conventional plastic-bonded insulation materials, the use of Multipor ETICS with a mineral-based finishing render eliminates the need for toxic biocides in the final coat.

Thermal insulation
Mineral-based and therefore fiber-free, Multipor mineral insulation boards take thermal insulation to a new level: Solid and highly thermally insulating with a thermal conductivity of up to $\lambda = 0.042$ W/(mK). Multipor insulation can significantly reduce a building’s energy demand, resulting in long-term energy and cost savings. Insulation not only makes sense in terms of heating costs; optimal thermal insulation also increases the value of a property. Furthermore, the system more than satisfies the increasingly stringent requirements of the German Energy Saving Ordinance (EnEV).

Quick and easy to apply
Multipor mineral insulation boards allow interior insulation to be fitted without using costly vapor barriers. The manageable size and low weight of the insulation boards makes the process virtually effortless. Precision-cutting closers and recesses for pipe penetrations is child’s play. The solid, dimensionally stable material is quick and easy to apply. And being free from fibers, it is pleasant and safe to work with. Multipor mineral insulation boards bond readily using the Multipor lightweight mortar specially formulated for the system. The boards can easily be sanded to remove any surface irregularities.

Moisture control and a healthy indoor climate
Conventional solutions for vapor-resistant interior insulation have led to a variety of problems and costly refurbishments due to vapor barriers being incorrectly installed. In contrast, vapor-permeable and capillary-active Multipor mineral insulation boards can regulate the moisture balance independently. They absorb condensation and release it again without forfeiting their basic product characteristics, and so create a balanced indoor climate.

Eco-friendly insulation system
Multipor mineral insulation boards are produced in an eco-friendly way with the raw minerals lime, sand, cement and water combined with a pore generator. These constituents make Multipor an environmentally safe building material. Multipor mineral insulation boards have been certified by the German Institute for Construction and Environment (IBU) for their outstanding environmental compatibility.

Multipor has also been awarded the natureplus seal of quality by the International Association for Sustainable Building and Living as a sustainable, future-proof product. The certification of Multipor mineral insulation boards confirms that the product is non-polluting, does not release harmful emissions and has an excellent environmental footprint – from the raw materials to the manufacturing process, and finally to disposal.
ESUCCESSFUL PLANNING AND CONSTRUCTION WITH BIM

The construction industry is undergoing its very own digital revolution. Most Multipor insulation solutions are now available on the Xella website as BIM objects in established Revit and ArchiCAD formats. Data from here can be transferred directly into the planning process.

COMPLETE SYSTEM CONFIGURATION

All relevant data for the design and planning of facade, interior wall, roof or ceiling insulation are available for Multipor. This allows planners to incorporate system solutions with different insulating effects into their projects. Multipor experts have selected more than 150 typical designs for facade insulation (ETICS), internal wall insulation, roof and ceiling insulation from our diverse product range and prepared them as BIM objects. The system solutions include not just Multipor mineral insulation boards, but our other wall elements too, so that users can model the entire system configuration.
THE FOURTH DIMENSION

BIM data models can be used to illustrate the entire building life cycle, from inception to recycling of the building. BIM adds a fourth dimension – time – to the modelling process, enabling the entire construction project to be planned and visualized throughout its lifetime. This multidisciplinary approach to modelling helps planners optimize construction site processes and logistics workflows. Quantities, build costs and building materials, machines and personnel are included in the model from the outset, enabling construction and assembly processes to be simulated. Deadlines can be predicted with greater accuracy, and conflicts and problems detected at an early stage. BIM data models are an invaluable basis for building management, demolition, disposal and material recycling.

EASY DOES IT

The Multipor Library contains over 150 typical insulation designs as BIM objects in Autodesk Revit and ArchiCAD file formats. Log on at www.multipor.com/bim.php and download the relevant product free of charge for unlimited use.

TRANSPARENT PROCESSES

When planners adopt the BIM modeling approach, the whole team collaborates on a single data file. All information about every aspect of the project is stored in a data model. Information about possible changes to the design can be accessed directly by all those involved, both as a drawing and a data package. For instance, if you change the thickness of the insulation, the measurements in the model are adjusted accordingly. And when the measurements change, the cost calculation is automatically adjusted. What’s more, interface problems are immediately visible to all those involved in the design process. This creates transparency throughout the entire process, from the planner to the client, and prevents planning errors from the outset. For me, the benefits of planning and construction with BIM are crystal clear – it’s all about transparency.

Dr Holger Griebel, Head of Product Management Multipor
ENEV 2017 ON THE HORIZON

The current version of the German Energy Saving Ordinance (EnEV) only partially transposes the European Energy Performance of Buildings Directive (EPBD). From 2021 onwards, all new buildings should be nearly-zero-energy buildings, whilst public buildings must comply with this requirement as early as 2019.

EnEV
The Energy Saving Ordinance

EnEG
Energy Saving Act

EEWärmeG
Renewable Energies Heat Act

It is assumed that the German government will take this opportunity to simplify existing energy requirements and merge the regulations to create a Building Energy Law. This new law will combine and harmonize the Energy Saving Act (EnEG) and the Renewable Energies Heat Act (EEWärmeG). More stringent requirements are expected in terms of new buildings, existing buildings and renewable energy to improve climate protection. The German Ministry of Construction is currently examining the impact of existing requirements on residential building costs.
Ultimately, energy-saving requirements have been largely responsible for an increase in general build costs. Whether these additional costs are offset by savings on energy costs, and above all, heating costs will also be examined. Cost considerations should not be overlooked in the implementation of the European Energy Performance of Buildings Directive: “This directive promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness.” (Source: European Directive on the Energy Performance of Buildings EPBD). One can only hope that the German amendment takes account of European directives and that the cost-benefit-ratio will be preserved. Xella’s Multipor insulation system contributes to cost-effectiveness, whilst at the same time taking energy-saving, value-retention and recycling requirements into account.

MULTIPOR IS READY

With Multipor, we are ideally prepared and so unfazed by the challenges presented by the revised Energy Saving Ordinance. To assist with energy performance planning, the Multipor website provides detail drawings and a digital thermal bridge catalogue for calculating thermal bridges. Thermal bridges are weak spots which reduce the energy efficiency of the building envelope and should be avoided. The additional losses caused by geometric or construction-related thermal bridges increase a building’s heating demand by 25 percent or more.

Well-thought-out detailed solutions can help put a stop to these ‘cold spots’. The Xella Thermal Bridge Catalogue contains typical detail drawings for solid masonry construction and modernization projects. These have proven equivalence with all the details in Supplementary Sheet 2 of DIN 4108. This precise verification process eliminates the need to apply a general – i.e. non-specific – thermal bridge correction factor.

The latest developments and information concerning the Energy Saving Ordinance can be found in the online version of this Insulation Guide. We also publish the latest developments on our website, along with corresponding product solutions.

CHANGE AHEAD

The revision is expected to be published at the start of 2017. So what is likely to change? Substantial changes are anticipated regarding thermal bridges. A project-based thermal bridge correction factor is expected to be introduced in the revised Energy Saving Ordinance. Corrected values may be considered in situations where construction details do not correspond to the design examples in DIN 4108 Supplementary Sheet 2. Drafts of the new DIN V 18599-2 and the planned new supplementary sheet 2 already address these concerns.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>EnEV requirements increased</td>
</tr>
<tr>
<td>from 2019</td>
<td>Public buildings must conform to the nearly-zero-energy standard in accordance with the EPBD</td>
</tr>
<tr>
<td>2016</td>
<td>Revised EnEV requirements came into force</td>
</tr>
<tr>
<td>2017</td>
<td>New draft law on energy-efficient building expected</td>
</tr>
<tr>
<td>2021</td>
<td>Nearly-zero-energy standard for all new buildings and renovation roadmaps for existing building stocks at EU level</td>
</tr>
</tbody>
</table>
Head of Product Management Multipor for Xella Deutschland GmbH Dr Holger Griebel has more than twenty years’ experience in the construction industry. Here he gives us some inspiring and personal insights into his work.

What’s new at Multipor?
You’re holding one of our latest achievements in your hand, the 2nd edition of the German Multipor Insulation Guide, now available in English. The guide is designed to provide advice and suggestions about the use of Multipor. In terms of new products, we have launched the plinth insulation board and the compact plus interior insulation. The plinth of a building is subject to significant stresses, so the requirements for insulation in this area are correspondingly high. The Multipor plinth insulation board exceeds these requirements, even in terms of non-combustibility. The Multipor compact plus interior insulation system increases the surface temperature in critical areas and so prevents mold. The trend towards digitalization is another new aspect of the construction market. We have responded swiftly to this development. Our products are BIM-ready.

In your view, what are the benefits of BIM?
Projects of all sizes can be handled in one single file. I also like this transparent approach to planning. The model and all its dimensions can be accessed by everyone involved.

Is BIM likely to catch on in the medium term?
It’s not a question of if, but when. Overcoming a fear of the unknown is the main hurdle. But you just have to give it a go and get some experience. If you run into difficulties, there are plenty of places to turn to for support. And our specialist staff at Multipor are always happy to help.

What can we expect from EnEV 2017?
It seems likely that a project-based thermal bridge correction factor will be introduced. We’re not worried about this. We have an excellent insulating material, low-thermal bridge insulation solutions, detail drawings and a digital thermal bridge catalogue. Our experts are happy to provide help and advice where necessary and in special cases.
Have we seen an end to discussions about fire protection with regard to ETICS?

Yes, absolutely. The engineering specifications are set out in the approvals. Fire barriers are now mandatory for certain insulating materials and building heights. However, the question of the complexity of installation and subsequent recycling still needs to be addressed. It is better to use a single, non-combustible insulating material for the entire facade, from the plinth right up to the roof. Then the issue of fire barriers becomes redundant.

Are ETICS particularly suitable, or unsuitable, for certain project sizes?

We achieve good results in many areas of application, from family homes to large-scale publicly funded projects, and increasingly with housing associations and investors who are particularly concerned about value retention. These target groups require reliability above all else. And no nasty surprises during demolition or when disposing of the building materials.

What is Multipor doing to address the issue of material life cycles?

We provide Multipor Big Bags to collect processing waste on the building site, which is then returned to the production process. So virtually nothing goes to waste and the loop is closed.

Why should a building contractor choose Multipor?

Multipor interior insulation ensures a well-balanced indoor climate. Mold has no chance, because Multipor acts as a moisture buffer, drawing water from the surface. It works in exactly the same way with ETICS. Materials that dry off quickly are less prone to attack. This is why Multipor insulation boards and systems with mineral-based finishing render do not need biocidal treatment. So Multipor is completely safe and eco-friendly.

Two sentences about the new Multipor Insulation Guide?

The industry is facing many changes: New regulations, unknown territory (BIM) and changing customer requirements. We have addressed these changes in the second edition of the Insulation Guide.

What other trends are emerging in the construction industry?

Well, the digitalization of business processes is an obvious one. Not just BIM, but production processes as well, for example. By adapting to these changes quickly, we gain a competitive edge.
Recycled Multipor mineral insulation boards are fed back into the production process or used in high quality Ytong AAC.

Production of insulation boards
1 m³ raw material is needed to produce 8 m³ Multipor mineral insulation board.

Recycling
Recycled Multipor mineral insulation boards are fed back into the production process or used in high quality Ytong AAC.

Completed building
Construction of energy-efficient buildings.

Resources
Extraction of natural resources – lime and sand.

Production
Continuous improvements to production processes and reduction in CO₂ emissions.

It is an inescapable fact that, in the long term, we must take a leaf from nature’s book and adopt the life-cycle principle. The solution is to take a more considered approach to product design to ensure that all materials used circulate continuously in biological or technical cycles. So right from the start, we should be thinking about what will happen at the end – and focus on continuous product cycles.

RECYCLING – THE ETERNAL CYCLE
People generate a wide variety of different waste types which pollute our environment for prolonged periods because they are excluded from natural material cycles. Valuable resources concealed in the waste are used only once before being irretrievably lost in incineration plants or landfill.
Multipor is keen to recycle as many of the raw materials we use as possible on both economic and ecological grounds. So Multipor products are compatible with the life-cycle approach. This means that they can be fed back into the raw material cycle and used in the production cycle to create new Multipor or AAC products.

**XELLA CLOSES THE LOOP WITH BIG BAGS FOR MULTIPOR WASTE**

Xella Deutschland has developed a simple and effective means of closing the loop for Multipor mineral insulation boards. Much too good to throw away: Multipor mineral insulation boards have been a popular insulating material for many years, mainly due to their excellent thermal insulation properties. This is largely down to the air trapped in the pores. And air is known to be a very good insulator. But on most building sites, offcuts and waste end up in the skip. Although the quantities may be small, this waste creates disposal costs for the builder and is irretrievably lost as a raw material. Our search for an ecological and cost-effective solution led us to the Big Bag scheme. Customers can order a building site recycling pack along with their building materials – comprising big bags and coded closures together with a return label and accompanying leaflet.

Multipor offcuts are sorted and collected in big bags on site. The bags are then sealed with coded closures, placed on pallets and returned to the production plant. Here the waste is ground down and fed back into the production process.

Since introducing the Big Bag scheme, more than 412 tonnes of mineral insulation has been fed back into the loop within a year. Not bad, considering that 210 million tonnes of mineral waste are generated each year in Germany – around 60 percent of Germany’s total volume of waste. Another reason why the Multipor material loop is ecologically and economically valuable for the environment.

For more information about recycling, please go to [www.multipor.com/recycling.php](http://www.multipor.com/recycling.php)
A healthy living environment and ecological considerations are important assessment criteria for building materials. Then there’s the question of sustainability, which Multipor has addressed with its recycling strategy. Annette Hillebrandt, Professor of Building Construction, Design and Materials Science at the University of Wuppertal, takes a look at thermal insulation during the transition to clean energy.

**PROF. ANNETTE HILLEBRANDT**

Member of the Association of German Architects (BDA)
Professor of Building Construction, Design and Materials Science at the University of Wuppertal,
research focus:
Life cycle potentials in high-rise buildings.
Associated architect
m. schneider a. hillebrandt architektur, Cologne

**THERMAL INSULATION HAS A LONG HISTORY**

The need for protection – from forces of nature, wild animals or attacks from other people – has always provided the starting point for improving our shelters, as well as for perfecting their thermal insulation. Even in the Bronze Age, people living in cold climates discovered the benefits of cavity walls, using the trapped layer of air for insulation. Or covered their roofs with straw or reeds – inherently insulating materials which contain a natural air layer. Time and effort were spent gathering fuels to burn in hearths that were more or less open. So it was worth taking greater care to insulate the exterior components when the dwelling was constructed, rather than be burdened with the constant daily task of collecting fuel. Nowadays we would say that the aim was to minimize the heating demand.
This attitude changed when industrialization precipitated the extensive extraction of fossil fuels on a global scale. For decades the ‘energy demand for heating’ parameter, even in simple homes for the majority of the population, was overlooked. The building envelope satisfied the need for stability, protection, water and wind tightness and at best, social status.

It was not until the publication of ‘DIN 4108: Thermal insulation in high-rise buildings’ in the middle of the last century that the term ‘minimum standard of thermal insulation’ was coined, signaling an initial awareness of the issue – even though the primary aim was to satisfy requirements for comfort and hygiene. The impact of the first energy crisis finally convinced us of the need to change the parameters again. This led to the rapid publication of the first German Ordinance on Thermal Insulation (Wärmeschutzverordnung) in 1977. It was not the scientists’ words of warning, but our own experience of energy shortages which brought about this rethink.

Today we have achieved passive house insulation standards; nearly-zero-energy homes and even energy-plus homes are a reality. After centuries, we have come full circle back to the realization that we should aim to minimize the heating demand. The global Paris Climate Agreement and the EU Commission’s new climate protection plans now present us with new challenges. As predicted in “The Limits to Growth”, our quality of life, and ultimately our survival on this planet, depend on two factors: The continuing availability of large quantities of resources – that can be extracted with reasonable effort – and a drastic reduction in environmental pollution.¹

It’s not energy that we are short of, but raw materials, compounded by a vast amount of waste generated by the construction industry, which in Germany amounts to more than 50 percent of the total volume of waste.² This waste contains many hazardous substances. Well-insulated homes can reduce some of the environmental pollution caused by CO₂ emissions from the combustion of fossil fuels. But this proportion, and thus the impact on climate protection, is rapidly diminishing, especially as we gradually switch to renewable fuels.

From a research standpoint, the energy transition has been accomplished and all that remains is to solve the problems of storage (on a large scale) and distribution. The legacy of the energy transition – environmental pollution as a consequence of disposal – is our future concern. A hazard warning label has only recently become mandatory throughout the EU in accordance with the CLP Regulation for hexabromcyclooctadecane (HBCD), a substance which has been widely used as a flame retardant in polystyrene insulating materials for decades. Now classified as hazardous, it may only be disposed of by incineration in waste disposal facilities which are licensed to handle this type of waste, and supporting documents must be provided.

THE HOUSE AS AN URBAN MINE:
DESIGNING BUILDING MATERIALS FOR CLOSED LOOP REUSE AND RECYCLING
Products containing HBCD can no longer be recycled.  

Another disposal problem resulting from the energy transition relates to the generation of renewable energy from wind turbines. Wind turbine blades are usually made from glass-fiber reinforced plastics, materials which cannot be recycled in the foreseeable future.

Policymakers are called upon to swiftly introduce ‘proof of resource conservation’ as a basis for issuing building permits. Before planning permission can be granted, a deconstruction plan must be submitted, together with proof that the building can be disposed of at the end of its life in a way that is cost-neutral for society as a whole. By designing and constructing the house as an ‘urban mine’, in other words, as a structure made from recyclable materials that can readily be dismantled, the owner can generate an income from the sale of the materials when the building is deconstructed. If, on the other hand, the deconstruction process generates waste which is disposed of in landfill or even entails the disposal of hazardous substances, the building permit should only be granted if the owner provides a corresponding reserve fund in the form of a deposit. This is the only way to prevent disposal costs at the end of a building’s life being passed on to society – the decommissioning of nuclear power stations being a notable example.

The future of any product design within “The Limits to Growth” lies in recognizing resource depletion and environmental pollution as key parameters and establishing a “Design for Urban Mining”. All materials and substances used in construction must be recyclable to the same quality grade as the original product. It must be possible to selectively deconstruct and recover all installed materials and components. Future insulating materials will make the leap from the energy transition to the resource transition!

1 Dennis Meadows “The Limits to Growth – A Report for the Club of Rome’s Project on the Predicament of Mankind” dva informativ, Stuttgart 1972
3 German Federal Environment Agency publication “Answers to frequently asked questions to hexabromcyclododecane (HBCD)”. Download at https://www.umweltbundesamt.de/publikationen/answers-to-frequently-asked-questions-to
ENVIRONMENTAL CERTIFICATES THAT COMPLY WITH INTERNATIONAL STANDARDS

Multipor has three environmental product declarations which comply with global standards. The three environmental certificates below enable planners and builders to make a conscious decision to choose an insulation system that has been independently verified as ecological and low-emission, largely comprising the mineral-based raw materials lime, sand, cement, and water.

The Environmental Product Declaration from the German Institute for Construction and Environment (IBU), which complies with ISO 14025 /14040 ff. and DIN EN 15804, certifies that Multipor mineral insulation boards are low-polluting, do not release harmful emissions and have an excellent environmental footprint.

Multipor has also been awarded the ‘natureplus’ seal of environmental quality in recognition of its high level of environmental compatibility. This prestigious ISO 14024-compliant environmental seal is granted only to construction products from sustainably sourced raw materials which are produced in a climate-friendly, non-polluting way and do not release any harmful substances into the environment.

Indoor air analysis is carried out to measure and compare air pollution in indoor environments. The volatile organic compound (VOC) content of Multipor mineral insulation boards has been tested and certified by the private eco-INSTITUT in Cologne. VOCs can cause symptoms such as headaches, tiredness or a general feeling of unwell. The investigation showed that Multipor is free from harmful concentrations of VOCs. Both Multipor mineral insulation boards and Multipor lightweight mortar achieved the highest standard: A+. The product has therefore been awarded the eco-INSTITUT label in recognition of its environmentally friendly raw materials.