4 Multipor interior insulation systems
Older buildings often have poor insulation, if any at all. Inadequate thermal insulation on the outside walls favors mold growth on the inside and leads to increased energy consumption in winter and high indoor temperatures in summer. This creates an uncomfortable indoor climate and may even cause significant structural damage.

When renovating old buildings, it is no longer enough to simply replace the heating system and fit new windows. It’s also a matter of preserving architecturally diverse exteriors and at the same time increasing their energy efficiency in a meaningful yet sensitive way. Creating a comfortable living space is also an important factor.

Multipor interior insulation systems are the perfect solution for mold remediation, thermal bridge optimization and interior insulation projects requiring the highest level of energy efficiency. Multipor satisfies all the requirements for modern interior insulation with the slender, space-saving 30 or 40 mm thick Multipor compact plus system or the interior insulation system from 60 to 300 mm.

**Good structural reasons for insulating a building with a Multipor interior insulation system:**
- Increases surface temperature and so prevents condensation forming at the surface
- This in turn prevents moisture-related mold growth on the surface of the walls
- Improves thermal comfort
- Extends the life of the building by going beyond minimum thermal insulation requirements

In existing buildings, a comfortable indoor climate can be achieved even with a low insulation thickness.

Satisfies the highest energy efficiency standards, including passive house standards where achievable.

The use of Multipor mineral insulation boards for interior insulation is far more than a mere cosmetic solution. To improve the energy efficiency and overall comfort of a building and operate the property economically in the long term, it is often the only solution.

**4.0 Multipor interior insulation systems/Multipor compact plus**

- Cost-effective interior insulation systems for old and new buildings
- Special thermal and moisture transmission properties for a comfortable indoor climate
- Ideal for preventing mold
- Preserving the facades of listed buildings
- Perfect for half-timbered buildings and basements
- Useful if an adjacent property excludes the use of an ETICS
- May be eligible for DGNB certification and KfW grants
- Healthy, environmentally friendly systems certified by natureplus, IBU declaration and highest A+ rating from the eco-INSTITUT
**Multipor interior insulation**

The Multipor interior insulation system is a cost-effective and energy-efficient means of insulating old and new buildings. Available in insulation thicknesses ranging from 60 to 300 mm, it is suitable even for complex refurbishment projects, including listed buildings. Multipor mineral insulation boards enable rooms to heat up quickly and ensure optimal heat retention. Their excellent permeability and capillary structure reliably insulates even half-timbered buildings without the need for vapor barriers.

- **Perfect solution for high quality energy-efficient refurbishments**
- **Cost-effective interior insulation system for new buildings too**
- **Vapor-permeable and capillary-active – no need for a vapor barrier**
- **Preserves the facades of listed and historic buildings**
- **Perfect for half-timbered buildings and basements**
- **Useful if an adjacent property excludes the use of an ETICS**
- **Can generally be fitted quickly, easily and securely without additional anchor fixings**
- **Healthy, environmentally friendly system certified by natureplus, IBU declaration and highest A+ rating from the eco-INSTITUT.**

---

**Multipor compact plus**

Multipor compact plus is an excellent choice if the main aim is to prevent mold and reduce thermal bridging. At just 30 or 40 mm thick, with these slender, compact insulation boards you don’t have to forfeit much living space. They effectively increase the surface temperature of the walls to prevent mold formation and create a more comfortable indoor climate. They reduce heating costs too.

- **Improves the energy performance of existing walls to prevent mold formation**
- **More comfortable indoor climate**
- **Vapor-permeable and capillary-active – no need for a vapor barrier**
- **Provides effective thermal insulation with \( \lambda = 0.045 \text{ W/(mK)} \), despite space-saving format**
- **Quick, clean and easy installation**
- **Packed in cardboard boxes for effortless transportation to site and easy handling**
- **Healthy, environmentally friendly system certified by natureplus, IBU declaration and highest A+ rating from the eco-INSTITUT.**

---

**Multipor mineral insulation board**

**Multipor compact plus mineral insulation board**

**Thomasblock, Oldenburg**

**Old weaving mill in Fulda**
4.2 General introduction and planning

Experience proves us right
Millions of square meters of interior walls insulated with Multipor or Multipor compact plus interior insulation are the result of our extensive experience in the field of interior insulation, which now spans over 20 years. Experience which enables you to fit up-to-date, energy-efficient insulation to existing buildings.

Advantages at a glance
- Vapor-permeable and capillary-active – the system needs no vapor barrier
- Best fire protection – non-combustible insulating material (Class A1 fire rating)
- Thermal insulation and thermal storage combined
- Sounds solid – like monolithic masonry
- High compressive strength combined with mesh-reinforced plaster
- Safe and easy-to-use
- Can frequently be applied to existing surfaces
- Versatile surface finishes from interior silicate paints and mineral plasters to wallheaters mounted to Multipor mineral insulation boards offer scope for creative freedom.
- Pioneering specialists in the field of capillary-active interior insulation
- Tried and tested.

Healthy, natural and environmentally friendly
Thanks to its natural constituents, Multipor mineral insulation board is an ecologically valuable, non-toxic insulating material.

The environmental product declaration (EPD) issued by the German Institute for Construction and Environment (IBU) documents its ecological properties. You can find it in the download area of our website at www.multipor.com. The insulation board has also been awarded the natureplus eco-label in recognition of its environmental compatibility.

Finally, the eco-INSTITUT in Cologne confirmed that the board meets the strictest requirements on pollutants and emissions by awarding

Table 1: Characteristic values of Multipor interior insulation systems

<table>
<thead>
<tr>
<th></th>
<th>Multipor mineral insulation board</th>
<th>Multipor compact plus</th>
<th>Multipor lightweight mortar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulations</td>
<td>National technical approval Z-23.11-1501</td>
<td>National technical approval Z-23.11-1501</td>
<td>Lightweight mortar LW as per EN 998-1</td>
</tr>
<tr>
<td>Dry bulk density</td>
<td>85 – 95 kg/m³</td>
<td>100 – 115 kg/m³</td>
<td>approx. 770 kg/m³</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>≥ 200 kPa</td>
<td>≥ 300 kPa</td>
<td>CS II; 1.50 – 5.0 N/mm³</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>λ = 0.042 W/(mK)</td>
<td>λ = 0.045 W/(mK)</td>
<td>λ_{10, e} = 0.18 W/(mK)</td>
</tr>
<tr>
<td>Water vapor diffusion</td>
<td>μ = 2</td>
<td>μ = 3</td>
<td>μ ≤ 10</td>
</tr>
<tr>
<td>Building material class</td>
<td>A1; non-combustible</td>
<td>A1; non-combustible</td>
<td>A2-s1, d0; non-combustible</td>
</tr>
<tr>
<td>Dimensions /delivery</td>
<td>600 x 390 mm d = 60 – 300 mm</td>
<td>500 x 390 x 30/40mm</td>
<td>20 kg/bag</td>
</tr>
<tr>
<td>quantity</td>
<td>(in increments of 20)</td>
<td>(L x W x D)</td>
<td></td>
</tr>
<tr>
<td>Special format d = 50 mm with λ = 0.045 W/(mK)</td>
<td>500 x 390 x 30/40mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
it the highest Category A+ rating.
Rooms insulated with Multipor mineral insulation boards do not emit harmful VOC emissions via their insulation systems.

**Non-combustibility for peace of mind**
When redeveloping existing housing stock, very careful consideration should be given to fire protection. The existing walls may have been built at a time when little or no thought was given to the matter. Multipor mineral insulation board has been designated a Class A1 construction and insulating material (non-combustible) in accordance with DIN EN 13501-1. Together with the accompanying Multipor lightweight mortar, the systems are entirely safe because in the event of fire, even at extremely elevated temperatures, they do not produce smoke, toxic fumes or burning droplets – advantages that can save lives.

**Sound insulation with Multipor**
Insulating materials often change a building’s acoustic performance – and interior insulation in particular can have a significant impact on the wall’s sound insulation. So at the Xella Technology and Research Centre, we have been investigating the factors affecting both the insulated component and the subsequently installed partition walls.

On the test bed we measured sound transmission through adjacent walls insulated with Multipor and studied the impact on the weighted sound reduction index of the partition wall in different installation conditions (Fig. 1).

During the course of these measurements, we did not find any significant impact on the sound reduction index of the partition wall.

Subsequently installed dry-lined internal walls thus continue to offer complete flexibility when it comes to configuring the living space, since the interior insulation – in terms of sound insulation – does not have to be breached to connect the partition walls (Fig. 1).

A test report from the Xella Research and Development Center is available on request.

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**Fig. 1: Sound transmission via solid wall adjacent to dry-lined wall**

**Variant 1: Multipor separated; dry-lined wall connected directly to the external wall**

**Variant 2: Multipor continuous; dry-lined wall connected to the Multipor insulation**
Creative surface finishes
The versatility of Multipor and Multipor compact plus interior insulation systems offers tremendous scope for creativity in terms of the surface finish. Here are a few examples:
- Thin-film felted, textured or smooth finishing plaster on the reinforcing layer
- Vapor-permeable wallcoverings and paints
- Dry lining solutions on subframe
- Tiles on the reinforcing layer.

Please see Chapter 4.4 for more information on surface finishes, or download the surface finish guide from the download section of our website at www.multipor.com.

Thorough building survey provides sound basis for planning
As the level of insulation in buildings increases, so too does the planning complexity. And it is important to bear in mind that the maximum thickness of energy-saving insulation is not always the most sensible solution for existing buildings. In addition to energy efficiency, consideration should also be given to a healthy indoor climate with reference to DIN 4108-3 (Thermal protection and energy economy in buildings; Part 3: Protection against moisture subject to climate conditions). Although levels of thermal insulation that comply with today’s standards may not be possible in many existing buildings, a reduced insulation thickness can nevertheless significantly increase housing quality and noticeably reduce energy consumption.

For this reason, it is important to carry out a survey of the existing building as shown in Figure 2 before planning the interior insulation. The purpose of this survey is to obtain information about the aim of the insulation measure as defined by the client/building contractor (e.g. achievement of minimum thermal insulation standard) alongside any usage or listed building requirements that may apply. This step ensures the lasting success of the construction and refurbishment work.

A site visit – involving visual inspections at the very least – is essential to gain a reliable and comprehensive understanding of the existing structure. The visit should focus less on thermal performance and more on assessing the overall structural situation, including moisture, sound and (where appropriate) fire protection.

The following criteria should be agreed in writing by the building contractor/client and planner:
- Assessment of the building’s location (protected or exposed position etc.)
- General condition of the masonry/existing fabric of the building
- Situation regarding moisture levels in the building, with reference to salt deposits where relevant
- Protection against driving rain (cladding, paint, plaster) and driving rain load on the external facade, exposure level of individual facades (as per Table 2)
- Other sources of moisture within the structure (rising damp, defective guttering etc.)
- Indoor climate
- Assessment of the condition of the building, including any damage, mapping where necessary and collating data on the property.
- Subsequent use of the building and of rooms designated for energy efficiency upgrades.

A pleasant indoor climate is all-important
Multipor interior insulation achieves the minimum thermal insulation standard and is therefore guaranteed to improve the energy-efficiency of buildings. At the same time, by increasing the surface temperature it also enhances well-being and counteracts mold growth. However, consideration should always be given to connected structures and adjacent ceilings and walls when carrying out refurbishment work. Further improvements to the thermal insulation can be achieved with relatively little effort here by reducing existing thermal bridges to harmless levels.

With Multipor interior insulation, spaces used only occasionally – such as churches or other public buildings – heat up quickly to ensure greater comfort. The heat energy remains in the room instead of seeping straight out through the cold internal walls.
A comfortable indoor climate requires a well-coordinated overall plan

Old, draughty windows result in high air exchange rates within the building, thereby reducing the risk of mold formation. On the downside, they also lead to high heating costs. Consequently, a well-coordinated overall energy-efficiency plan is needed when installing new high-performance windows, because without corresponding interior insulation, there is an increased risk of mold. So we always recommend insulating external walls, including the window reveals, at the same time as replacing windows since moisture...
4.0 Multipor interior insulation systems

4.2 General introduction and planning

Creating a comfortable indoor climate is an important objective when selecting construction materials and insulation. DIN EN ISO 7730 defines thermal comfort above all as a sense of satisfaction with the ambient climate. Although everyone perceives this feeling differently, it is perfectly possible to define generally applicable comfort zones (Fig. 3). The following key factors contribute to a comfortable indoor climate:

- Average temperature of the enclosing walls, including floors and ceilings
- Average indoor air temperature
- Average indoor relative humidity.

Chapter 7 on building physics contains in-depth information on the subject of indoor climate with detailed examples.

**Requirements for interior insulation**

Retrofitted interior insulation influences the building-physical behavior of the existing building. Special consideration must be given to water vapor diffusion from inside to outside, combined with the potential for condensation to form on the original, now cold inner surface of the structure. The external wall will also dry much more slowly after exposure to driving rain due to a decrease in the average temperature of the wall. Careful planning, a high-quality system such as Multipor interior insulation and meticulous workmanship will nevertheless guarantee successful insulation work.

The Multipor and Multipor compact plus interior insulation systems are regarded as forerunners in the field of vapor-permeable internal insulation. Their products and material characteristics have raised awareness of the importance of building physics in ensuring a simple, reliable construction process. This is borne out by a study which showed that a housing development insulated with Multipor almost 20 years ago was still free from damage. Our experts at Multipor will gladly work with you to ensure the success of your upcoming refurbishment project.

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**Fig. 3: Thermal comfort during sedentary activity, moderate activity and with suitable clothing as a function of the average surface temperature of the surfaces enclosing the room and the indoor air temperature; See Chapter 7.1 for further details**

As per W. Frank: “Raumklima und thermische Behaglichkeit” [Indoor climate and thermal comfort], Berichte aus der Bauforschung, Heft 104, Berlin (1975)
Current EnEV requirements for existing buildings

The current German Energy Saving Ordinance (EnEV) discusses the requirement levels for the refurbishment of existing buildings. The minimum thermal insulation standard is the minimum requirement for insulation on the inside of external walls, although the current EnEV no longer governs interior wall insulation for refurbishment purposes. A recommended U-value of 0.35 W/(m²K) for interior insulation can easily be achieved with Multipor, both technically and in terms of building physics.

Multipor interior insulation systems provide optimal solutions which comply with the latest general requirements for the exterior walls of existing buildings. The ordinance also stipulates that the impact of construction-related thermal bridging on heat energy consumption in old buildings should be kept to a minimum.

The general thermal bridge correction factor for interior insulation could spoil what initially seemed to be a well-conceived, energy efficient solution, resulting in an uneconomical thickness of insulation. This area offers further potential for energy savings of up to 30% based on a building’s annual heating demand. See Chapter 7.1.6 for more information on the EnEV.

As a service to you, we provide specimen structural calculations for selected thermal bridges in a wide range of constructions. Find the checklist in the download section of our website at www.multipor.com.

Types of interior insulation system

There are basically two options for interior insulation:

1. Vapor-retardant and vapor-impermeable interior insulation systems (Fig. 4):

These systems, such as stud wall constructions with mineral wool and vapor-retardant membranes or virtually vapor-impermeable synthetic foams, prevent the diffusion of water vapor into the walls from outside to inside, which also prevents existing walls drying inwards, as they would tend to do in summer. These vapor-retardant and vapor-impermeable systems must be handled with particular care during installation and subsequent use and require a high standard of workmanship – especially around details and connections. Experience shows that such systems – especially around connections – can easily be damaged during construction or subsequent use.

2. Vapor-permeable, capillary-active interior insulation systems (Fig. 5):

These modern, safe and well-tested systems allow water vapor to diffuse into the wall; they absorb any moisture arising, buffer it and transport it back to the inner surface by capillary action. This means that not only are moisture levels within the walls continuously reduced to a non-critical level, but the walls also remain vapor-permeable, which enables them to absorb...
moisture peaks from the indoor air and to dry increased moisture loads in the existing structure inwards. Multipor interior insulation systems are ideal for this purpose. The numerous areas of application are explained in more detail further in this guide. Chapter 7 on building physics explains how the different systems work.

**Fig. 4:** Operating principle of vapor-retardant interior insulation

**Fig. 5:** Operating principle of vapor-permeable interior insulation

**Temperature and vapor pressure trend**

- Interior
- Exterior
- Virtually no vapor flow
- No condensation

**Temperature and vapor pressure trend**

- Interior
- Exterior
- Higher vapor flow
- Condensation
- Capillary flow
Dr.-Ing. Hartwig M. Künzel from the Fraunhofer Institute for Building Physics in Holzkirchen on the subject of certifying the hygrothermal performance of interior insulation systems:

Mention the subject of ‘moisture transport in building materials’, and most practitioners will think of vapor diffusion, dew point and the Glaser method described in DIN 4108. Once a building element has been classified as ‘safe according to Glaser’, all is over and done with as far as the planner is concerned. The search for alternative assessment methods will only take place if moisture damage unexpectedly occurs or if the designed building element does not pass the standard Glaser assessment. Since condensation in winter due to vapor diffusion (which is what Glaser investigates) is only one of a large number of possible moisture loads, a positive assessment according to DIN 4108 may imply moisture safety which does not actually exist.

Indoor air convection, precipitation or rising damp are not usually considered. The same goes for construction moisture, which is becoming increasingly problematic in view of today’s deadline pressures. In order to allow for these affects too, we need to switch from Glaser’s simple steady-state assessment method to a realistic simulation of hygric processes in building elements. To this end, new non-steady-state calculation methods have gained acceptance among practitioners in recent years due to their reliability. This fact is also recognized in the redrafted DIN 4108-3, which now admits these methods.

The now widely used dynamic simulation model WUFI® [see Chapter 7] analyzes the relevant climatic and material data and the accuracy of the calculations, offering numerous advantages to practitioners. Some areas of application and novel possibilities for assessing the hygrothermal behavior of building components exposed to natural climatic conditions – which go significantly beyond Glaser – are listed below:

- realistic simulation of condensation during the heating period, allowing for water vapor sorption and capillary conduction
- drying of construction moisture
- summer condensation due to reverse diffusion
- solar radiation, driving rain load and surface condensation on roofs and facades
- effect of moisture on energy consumption.

The results for moisture and temperature fields in the component are available in any desired spatial or temporal resolution and may be used for:

- extrapolating experimental results
- transferring proven construction methods to different climatic conditions
- planning new buildings or renovation measures for old buildings
- developing and optimizing building products
- determining maximum permissible indoor moisture loads
- determining the hygrothermal requirements for and the limits of proper application of building materials and components.

In recent years, these advantages of hygrothermal simulations have created strong demand for computational investigations, especially in the context of renovating old buildings, since standard solutions are often not applicable here. Multipor mineral insulation board is already widely used for successful interior insulation. Since this product is stored in the WUFI® database, dynamic simulations of different structural components can be performed at any time.

In 1997 the WTA [International Association for Science and Technology of Building Maintenance and Monuments Preservation] established a WTA working group whose task is to draw up practical guidelines and regulate the use of hygrothermal simulation methods in the construction industry.
4.0 Multipor interior insulation systems

4.2 General introduction and planning

Fig. 6: Example wall construction with Multipor interior insulation

Solid interior insulation without vapor barrier: Wall composition from left to right

<table>
<thead>
<tr>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS II exterior render</td>
</tr>
<tr>
<td>Masonry (brickwork)</td>
</tr>
<tr>
<td>CS II interior plaster</td>
</tr>
<tr>
<td>Multipor lightweight mortar</td>
</tr>
<tr>
<td>Multipor mineral insulation board</td>
</tr>
<tr>
<td>Reinforcement</td>
</tr>
<tr>
<td>(Multipor lightweight mortar)</td>
</tr>
<tr>
<td>Finishing plaster/felted</td>
</tr>
<tr>
<td>(Multipor lightweight mortar or fine lime plaster)</td>
</tr>
</tbody>
</table>
**Wall construction with Multipor interior insulation systems**

Multipor mineral insulation boards in thicknesses of 60 to 140 mm are ideal where the main aim is to provide an effective level of thermal insulation. Even thicker boards are suitable for energy-efficient refurbishment to the highest standards. At this level, it is easily possible to cut heating oil consumption and CO₂ emissions by 80%, depending on the component.

**Practical tip:**

The following rule of thumb applies:

\[ U \times 10 = \text{heating oil consumption in liters per m}^2 \text{ of heated area and heating period} \]

\[ U \times 10 \times 3 = \text{CO}_2 \text{ emissions in kg per m}^2 \text{ of heated area and heating period.} \]

Figure 6 shows an example configuration of a Multipor interior insulation system. The U-value calculations for different wall types shown in Tables 3 and 4 are based on this system configuration.

It’s a different matter if the primary purpose of the refurbishment is to improve the indoor climate and/or prevent mold. In this case, due to the reduced thickness of insulation, it is only possible to achieve a ‘still comfortable’ indoor climate (Fig. 3).

Tables 3 and 4 illustrate the potential of interior insulation for different wall types, depending on the aim of refurbishment. Whilst the main aim of insulating with Multipor compact plus is to increase the temperature of the external wall on the inside, the use of thicker insulation illustrates the potential of energy-efficient refurbishment to significantly improve the U-value.

**Wall structures with Multipor interior insulation systems**

Using numerical climate modeling, we have verified all the layer configurations with Multipor mineral insulation board shown below. We did this by applying the temperature, relative humidity, direct and indirect solar radiation and driving rain typical of the mid-German climate to the outside of the building while maintaining a constant air temperature of 20°C and 50% relative humidity on the inside – in accordance with DIN 4108.

The result: The rising moisture level in the cold half of the year – mainly in gaseous form as relative humidity in the pore air – is non-critical because, without exception, it dries out completely during the evaporation phase. Nevertheless, it is important to comply with the latest directions for use when installing Multipor interior insulation to ensure its long-term structural performance within the system configuration.

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### Table 3: The use of Multipor interior insulation to improve the U-value of double-leaf walls

<table>
<thead>
<tr>
<th>Wall construction before thickness [mm]</th>
<th>U-values [W/(m²K)]</th>
<th>Wall construction with Multipor compact plus λ = 0.045 W/(m²K)</th>
<th>Wall construction with Multipor λ = 0.042 W/(m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium-silicate block λ = 0.99 W/(m²K)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>U-value before 2.43</td>
<td>2.43</td>
<td>2.43</td>
</tr>
<tr>
<td></td>
<td>U-value after 0.92</td>
<td>0.76</td>
<td>0.54</td>
</tr>
<tr>
<td>240</td>
<td>U-value before 1.86</td>
<td>1.86</td>
<td>1.86</td>
</tr>
<tr>
<td></td>
<td>U-value after 0.82</td>
<td>0.69</td>
<td>0.50</td>
</tr>
<tr>
<td>300</td>
<td>U-value before 1.67</td>
<td>1.67</td>
<td>1.67</td>
</tr>
<tr>
<td></td>
<td>U-value after 0.78</td>
<td>0.66</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Assumptions: Solid brick: \( \lambda = 1.2 \text{ W/(mK)} \), \( t = 11.5 \text{ cm} \), no air gap, masonry as per table, interior plaster: \( \lambda = 0.51 \text{ W/(mK)} \), \( t = 15 \text{ mm} \), After refurbishment: Lightweight mortar: \( \lambda_{\text{mortar}} = 0.18 \text{ W/(mK)} \), \( t = 10 \text{ mm} \), thermal resistance: \( R_e = 0.13 \text{ m²K/W} \), \( R_{\text{wall}} = 0.04 \text{ m²K/W} \)
### 4.0 Multipor interior insulation systems

#### 4.2 General introduction and planning

<table>
<thead>
<tr>
<th>Wall construction before</th>
<th>Thickness [mm]</th>
<th>U-values before [W/(m²K)]</th>
<th>U-values after [W/(m²K)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricks λ = 0.86 W/(mK)</td>
<td>115</td>
<td>2.76</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>175</td>
<td>2.31</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>240</td>
<td>2.17</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>2.13</td>
<td>0.80</td>
</tr>
<tr>
<td>Calcium-silicate block λ = 0.99 W/(mK)</td>
<td>365</td>
<td>1.53</td>
<td>0.76</td>
</tr>
<tr>
<td>Autoclaved aerated concrete (AAC) λ = 0.21 W/(mK)</td>
<td>150</td>
<td>1.29</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>0.73</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>0.60</td>
<td>0.43</td>
</tr>
<tr>
<td>AAC mounting component λ = 0.14 W/(mK)</td>
<td>300</td>
<td>0.32</td>
<td>0.37</td>
</tr>
<tr>
<td>Concrete λ = 2.1 W/(mK)</td>
<td>200</td>
<td>3.08</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>2.87</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>2.69</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Table 4: Improving the U-values of monolithic existing walls with Multipor interior insulation

<table>
<thead>
<tr>
<th>Wall construction with Multipor compact plus λ = 0.045 W/(mK)</th>
<th>30 [mm]</th>
<th>40 [mm]</th>
<th>60 [mm]</th>
<th>80 [mm]</th>
<th>100 [mm]</th>
<th>120 [mm]</th>
<th>140 [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall construction with Multipor λ = 0.042 W/(mK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assumptions:** Masonry as per table, interior plaster: λ = 0.51 W/(mK), t = 20 mm; exterior render: λ = 1.0 W/(mK), t = 20 mm; Thermal resistance: R_i = 0.13 m²K/W, R_o = 0.04 m²K/W
Our Multipor technical advisers will gladly discuss specific customer requirements and different building and component types in more detail.

As a special service to our customers, at Multipor we can certify the hygrothermal performance of a wide range of building components and structures using dynamic simulation programs (see Chapter 7.2.5). Our expertise in this area is the result of several thousand hygrothermal analyses translated into successful building practice. To help you plan with confidence, download the checklist from the download section of our website at www.multipor.com.

Follow the WTA recommendations for internal insulation
The International Association for Science and Technology of Building Maintenance and Monuments Preservation (WTA) publishes several sets of guidelines on the subject of interior insulation. WTA Guidelines for Division 6 [Physical and chemical fundamentals] cover interior insulation and its certification, while guidelines for Division 8 [Half-timbered constructions] contains a wealth of useful information about the energy-efficient refurbishment of half-timbered buildings.

As a supporting member of the WTA, Xella Deutschland GmbH helps to ensure that the Association’s latest findings and insights – and more besides – are published promptly.

By using the simulation methods referred to above and following the advice in the relevant WTA Guidelines, it is possible to successfully certify and safely install vapor-permeable, capillary-active Multipor interior insulation systems. Here is an extract from the latest, greatly extended “Technical guidelines for insulating the inside of external walls using interior insulation systems” [Technischen Richtlinie zur Innendämmung von Außenwänden mit Innendämm-Systemen] published by Germany’s ETICS trade association [Fachverband WärmedämmVerbundsysteme e. V.] in 2016:

“Successful certification means that the moisture content of the individual layers of material is limited by the system, damage does not occur and accumulated moisture can dry out again, i.e. the overall moisture content of the structure does not rise continuously over a period of several years.” Multipor interior insulation systems have been proven to satisfy this requirement with unerring reliability.

This simulation process also allows component connections – such as connected ceiling joists – to be included in the hygrothermal analysis. This ensures a safe wall structure and greater planning certainty when it comes to sensitive construction details.

Countless computational verifications confirm that the solid, entirely mineral-based systems function perfectly in practice. Numerous positive user experiences with Multipor interior insulation systems further highlight their effective and enduring contribution to energy-efficient thermal and moisture control.
Reference building

Thomasblock (former Donnerschwee Barracks), Oldenburg

- Redevelopment and sensitive conversion of barracks to residential development
- Preservation of listed facade
- Comfortable indoor climate and long-term environmental compatibility
- High level of thermal insulation and optimum fire protection
- Rapid installation without vapor barrier

**Project data**

<table>
<thead>
<tr>
<th>Building type</th>
<th>Residential development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Oldenburg</td>
</tr>
<tr>
<td>Application</td>
<td>Interior insulation</td>
</tr>
<tr>
<td>Products used</td>
<td>Multipor mineral insulation board, t = 100 mm</td>
</tr>
<tr>
<td></td>
<td>Multipor lightweight mortar</td>
</tr>
</tbody>
</table>
Reference building

Primary school, Duisberg

- Energy-efficient refurbishment of a listed school building
- Attainment of EnEV standard applicable at the time
- Energy costs savings of 70 %
- High standards of environmental health
- Quick and economical installation of around 1400 m² Multipor mineral insulation boards

Project data

<table>
<thead>
<tr>
<th>Building type</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Duisburg</td>
</tr>
<tr>
<td>Application</td>
<td>Interior insulation</td>
</tr>
<tr>
<td>Products used</td>
<td>900 m² Multipor mineral insulation board t = 100 mm</td>
</tr>
<tr>
<td></td>
<td>500 m² Multipor mineral insulation board t = 60 mm</td>
</tr>
<tr>
<td></td>
<td>Multipor lightweight mortar</td>
</tr>
</tbody>
</table>

Reference building

Multipor interior insulation systems 4.0

4.2 General introduction and planning
4.3 Detail drawings for interior insulation systems

**Horizontal window section**

**Vertical window section**

**Cross-section of foundations/interior insulation to external wall**

**Timber ceiling with exposed joists/interior insulation to external wall**

Interior insulation 16-001

Interior insulation 16-002

Interior insulation 16-003

Interior insulation 16-004

006 Thermal insulation
039 Impact sound insulation
040 Floating screed
067 Horizontal damp-proofing/barrier membrane
111 Separation or protective layer
117 Flexible sealing tape

149 Pre-compressed sealing tape
168 Existing masonry
169 Existing interior plaster (or levelling plaster)
172 Timber joists
173 Multipor lightweight mortar
174 Multipor reinforcement mesh
175 Corner protectors
177 Multipor reveal board
178 Multipor hemp-felt insulation strips
250 Multipor interior insulation
286 System-compatible interior plaster
330 Screed-edge insulation strips
Detail drawings for interior insulation systems

**Timber ceiling without exposed joists**/interior insulation to external wall

**Reinforced concrete ceiling with insulating wedge**/interior insulation to external wall

*Leave 2-3 mm wide joint between wall and ceiling insulation*

---

**Roof connection to timber joist ceiling**

**Roof connection to slab ceiling**

*Leave 2-3 mm wide joint between wall and ceiling insulation*

---

007  Reinforced concrete ceiling
040  Floating screed
135  Plasterboard
168  Existing masonry
169  Existing interior plaster
(or levelling plaster)
170  Existing ceiling plaster
172  Timber joists
173  Multipor lightweight mortar
174  Multipor reinforcement mesh
176  Multipor hemp-felt insulation strips
178  Trowel joint
180  Multipor internal insulation
190  Multipor insulating wedge
286  System-compatible interior plaster
328  Floorboards
329  Dry screed
330  Screed-edge insulation strips
333  Reed board

Download these and other detail drawings at www.multipor.com/detaildrawings.php
4.0 Multipor interior insulation systems

4.3 Detail drawings for interior insulation systems

**Detail drawings for interior insulation systems**

**Cross-section with wall heating**

**Wall heating – three-dimensional view**

**Timber framework/**

**Interior insulation with Multipor lightweight mortar**

**Interior insulation with Multipor clay mortar**

---

005 Exterior render
026 Membrane under roof, vapor-permeable
133 Lightweight mortar
168 Existing masonry
169 Existing interior plaster (or levelling plaster)
172 Timber joists
173 Multipor lightweight mortar
174 Multipor reinforcement mesh
182 Multipor reinforcement mesh 7 x 7 mm
250 Multipor interior insulation
286 System-compatible interior plaster
287 Multipor clay mortar
326 Multipor screw-in anchor (through mesh, approx. 4 anchors per m²)

Download these and other detail drawings at www.multipor.com/detaildrawings.php
Detail drawings for interior insulation systems

Ytong slab roof with Multipor mineral insulation board on the underside, eaves detail

Ytong slab roof with Multipor mineral insulation board on the underside, verge detail

* Leave 2-3 mm wide joint between wall and ceiling insulation

Ytong slab roof with Multipor mineral insulation board on the underside, ridge detail

001 Ytong masonry
006 Thermal insulation
007 Reinforced concrete ceiling
023 Rafters
024 Gutter
025 Roof tile/slate
026 Membrane under roof, vapor-permeable
028 Sarking board
030 Battens
081 Interior plaster
096 Mesh insert
100 Ring beam
139 Battens
150 Ytong roof panel
169 Existing interior plaster
173 Multipor lightweight mortar
174 Multipor reinforcement mesh
180 Trowel joint
211 Ytong precision panel
218 Galvanized steel angle
286 System-compatible interior plaster

Download these and other detail drawings at www.multipor.com/detaildrawings.php
4.0  Multipor interior insulation systems

4.3  Detail drawings for interior insulation systems

Detail drawings for interior insulation systems

Intersecting existing interior wall with straight insulation board

Direct connection of plasterboard wall to external wall

Intersecting existing interior wall with insulating wedge

Direct connection of plasterboard wall to Multipor insulation

006  Thermal insulation
013  Steel profile
135  Gypsum fiberboard
168  Existing masonry
169  Existing interior plaster (or levelling plaster)
173  Multipor lightweight mortar
016  Thermal insulation
013  Steel profile
135  Gypsum fiberboard
168  Existing masonry
169  Existing interior plaster (or levelling plaster)
173  Multipor lightweight mortar

160  Glass fiberboard
161  Vapour barrier
164  Water-repellent coating
165  Exterior wall
166  Air gap
167  Exterior wall
168  Existing masonry
169  Existing interior plaster (or levelling plaster)
173  Multipor lightweight mortar

013  Steel profile
135  Gypsum fiberboard
168  Existing masonry
169  Existing interior plaster (or levelling plaster)
173  Multipor lightweight mortar

160  Glass fiberboard
161  Vapour barrier
164  Water-repellent coating
165  Exterior wall
166  Air gap
167  Exterior wall
168  Multipor insulating wedge
173  Multipor lightweight mortar

160  Glass fiberboard
161  Vapour barrier
164  Water-repellent coating
165  Exterior wall
166  Air gap
167  Exterior wall
168  Multipor insulating wedge
173  Multipor lightweight mortar

174  Multipor reinforcement mesh
178  Multipor hemp-felt insulation strips
180  Trowel joint
250  Multipor interior insulation
254  Multipor insulating wedge
286  System-compatible interior plaster

Download these and other detail drawings at www.multipor.com/detaildrawings.php
4.4 Products and system components

Solid, dimensionally stable Multipor and Multipor compact plus mineral insulation boards come in lightweight, handy formats which can quickly and easily be cut to size and sanded smooth to give a neat finish. Installation is also quick and straightforward; the boards are simply bonded with Multipor lightweight mortar, so in most cases there is no need for additional mechanical fastening. The products undergo continuous internal and external production quality control before they arrive at the point of use or place of interim storage. A high degree of system reliability during subsequent use is further confirmation of product quality.

Delivery and handling
Multipor interior insulation systems together with all system components should ideally be delivered straight to the point of use wherever possible to avoid unnecessary costly and time-consuming interim transport. However, if interim storage is required, a stable, level and dry storage site should be provided. Our experienced haulage companies have vehicles equipped with a hydraulic crane or fork lift which carefully places insulating boards in individual packs or pallets on a flat substrate beside the vehicle.

It is also possible to set down the materials close to the installation site by arrangement, subject to feasibility. We can provide more compact vehicles to deliver goods to smaller construction sites by special arrangement. These vehicles are also suitable for supplying small additional quantities.

Only suitable, approved lifting gear is to be used for unloading and handling. Pallet trucks can also be used to transport Multipor mineral insulation boards on hard surfaces. The clamp on the lifting gear must pass round the pack and underneath the pallet to grip the load securely during unloading. Under no circumstances should the clamp grip or press the Multipor mineral insulation boards directly (see Fig. 1), nor should pallets be stacked. Care must also be taken to prevent any cables, chains or slings used during unloading from damaging the material.

Small, manageable packs of Multipor mineral insulation boards are bundled on a pallet which is shrink-wrapped to protect it from the weather. The shrink-wrap also serves to keep the packaging unit stable and should not be removed until just before use.

Small pack of Multipor mineral insulation board

Multipor compact plus comes in handy boxes which are palletized for delivery to the construction site or wholesaler.

Multipor pallet

Box of Multipor compact plus
Multipor tools
For safe and easy application

Multipor insulating wedges designed to reduce thermal bridging are also packed securely in handy boxes. The packaging can be disposed of responsibly (e.g. in Germany in compliance with Interseroh Contract No. 31560) – another way in which we help to protect the climate and environment.

Tools and resources
Construction progress is fast and proficient when you use tools designed for Multipor interior insulation systems.

Fine-toothed Multipor handsaw
Multipor mineral insulation boards can be trimmed to size accurately and effortlessly using a fine-toothed Multipor handsaw [1] [7 – 10].

Multipor notched trowel
Multipor notched trowels are designed to apply a full bed of Multipor lightweight mortar to the mineral insulation boards. Notch size per board thickness:
12-mm notched trowel for insulation thickness up to 140 mm
15-mm notch trowel for insulation thickness of 160 mm or above.
Clean notched trowels thoroughly immediately after use for perfect troweling every time [2].

Multipor paddle mixer
Multipor lightweight mortar should ideally be mixed to a workable consistency in a Multipor graduated bucket using a low-speed mixer with a long, sturdy paddle. Clean paddle mixers thoroughly after use for optimal mixing results [3].

Multipor sanding board
Multipor and Multipor compact plus mineral insulation boards can be sanded with ease. After sanding, remove the sanding dust with a hand
4.0  Multipor interior insulation systems

4.4  Products and system components

brush or industrial vacuum cleaner to ensure optimum adhesion of the Multipor lightweight mortar [4] [11].

**Multipor bucket**
Multiple buckets are ideal for mixing Multipor lightweight mortar. The bucket is graduated so you can easily measure the required amount of water accurately – 4 l for 10 kg and 8 l for a 20 kg-bag [5].

**System components**

**Multipor lightweight mortar**
Mix the Multipor lightweight mortar with the quantity of water indicated on the mortar bag according to the directions and the safety precautions. Note for example, that Multipor lightweight mortar should not be used if the air or surface temperature is below 5° C. The level indicator on the Multipor bucket simplifies the task of mixing the lightweight mortar [20 kg/bag] for subsequently bonding the Multipor mineral insulation boards, applying the reinforcement layer and smoothing if necessary. To obtain a workable consistency it is advisable to use a low-speed mixer with a long, sturdy paddle. Leave the mortar to stand for around 5 minutes and then stir again before use [6].

**Practical tip:** The graduated Multipor bucket makes it easy to add the correct quantity of water to the Multipor lightweight mortar.

- Add 8 l of water per 20 kg bag of Multipor lightweight mortar and mix with the paddle mixer.
- Processing time: approx. 1.5 hours, depending on the weather. Do not use if the surface or ambient air temperature is below 5° C.
- Multipor lightweight mortar has a high coverage rate; one bag yields 30 l of fresh mortar, which is enough to cover up to 6 m² with a 5-mm layer thickness, depending on the condition of the substrate.
Multipor lightweight mortar can also be applied with conventional plastering machines. The settings required vary, depending on the machine.

Always follow the technical data sheet and directions for use on the mortar bag. Multipor lightweight mortar can be stored on a pallet in a dry place for up to 12 months from the date of production.

Use only Multipor lightweight mortar, otherwise we cannot guarantee the performance of the Multipor insulation system.

**Multipor hemp-felt insulation strips**

Special care must be taken to ensure that the first course of internal insulation is plumb and level, allowing for any height differences in the adjacent floor construction. It is also important to isolate any structures likely to exhibit different expansion or settling behavior from the insulation board with decoupling strips. Multipor hemp-felt insulation strips are particularly suitable for ensuring optimal sound insulation and for decoupling Multipor and Multipor plus mineral insulation boards when fitting interior insulation up to intersecting flexible components (ceilings, floors or interior walls) [12].

| Table 1: Technical data for Multipor lightweight mortar |
|-------------------------------|----------------------------------|
| Lightweight mortar            | LW as per EN 998-1                |
| Compressive strength class    | CS II; 1.5–5.0 N/mm²              |
| Diffusion resistance factor   | µ ≤ 10                           |
| Water absorption due to capillary action | W2, c ≤ 0.2 kg/(m²·min⁰.⁵) |
| Thermal conductivity          | λ₁₀,dry = 0.18 W/(m·K)            |
| Building material class       | A2-s1, d0; non-combustible        |
| Weight per bag                | 20 kg                            |
| Pallet content                | 40 bags                          |

<table>
<thead>
<tr>
<th>Table 2: Technical data for Multipor hemp-felt insulation strips</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% hemp fibers</td>
</tr>
<tr>
<td>Approval</td>
</tr>
<tr>
<td>Bulk density</td>
</tr>
<tr>
<td>Thermal conductivity</td>
</tr>
<tr>
<td>Water vapor diffusion resistance factor</td>
</tr>
<tr>
<td>Building material class</td>
</tr>
<tr>
<td>Spec. heat capacity</td>
</tr>
<tr>
<td>Roll size L x W x H</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
4.0 Multipor interior insulation systems

4.4 Products and system components

### Multipor reveal boards

Multipor reveal boards are ideal for reducing thermal bridging round window reveals. Boards are available in thicknesses of 20, 30 and 40 mm, depending on space and requirements, and are processed in the same way as Multipor and Multipor compact plus mineral insulation boards [13] [14].

<table>
<thead>
<tr>
<th>Dimensions, delivery format</th>
<th>Size L x W x H [mm]</th>
<th>Unit/box</th>
<th>m²/box</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>600 x 250 x 20</td>
<td>12</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>600 x 250 x 30</td>
<td>8</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>600 x 250 x 40</td>
<td>6</td>
<td>0.90</td>
</tr>
</tbody>
</table>

### Multipor insulating wedge

Fit 500-mm wide Multipor insulating wedges to interior walls and ceilings where they intersect the external wall to reduce thermal bridging. Apply in the same way as Multipor mineral insulation boards [15] [16].

<table>
<thead>
<tr>
<th>Dimensions, delivery format</th>
<th>Size L x W x H [mm]</th>
<th>Unit/box</th>
<th>m²/box</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>390 x 500 x 60/20</td>
<td>10</td>
<td>1.95</td>
</tr>
</tbody>
</table>
Embed the Multipor reinforcement mesh gently into the top third of the freshly applied lightweight mortar, taking care to overlap joints by at least 10 cm \[17\] [18]. Coverage: 1.1 m²/m². The mesh is available in 1 m wide rolls and 25 or 50 m lengths \[19\].

### Health and safety on the construction site

Safety must always be a number one priority.

The processing of Multipor insulation systems is governed by safety requirements relating to working platforms and scaffolding as well as general construction site safety. Other technical rules and regulations also apply to ensure that construction site operations run smoothly.

These include general personal safety and hygiene measures such as the wearing of safety goggles and dust masks during sanding operations, especially when working overhead.

---

**Table 5: Technical data for Multipor 4 x 4 mm reinforcement mesh**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammage</td>
<td>160 +/- 5 g/m²</td>
</tr>
<tr>
<td>Mesh width</td>
<td>4 x 4 mm</td>
</tr>
<tr>
<td>Strength - on delivery</td>
<td>( \geq 1750 \text{ N/cm} )</td>
</tr>
<tr>
<td></td>
<td>( \geq 50% \text{ und } \geq 1000 \text{ N/cm} )</td>
</tr>
<tr>
<td>Roll size - width - length</td>
<td>1 m - 25 or 50 m</td>
</tr>
<tr>
<td>Coverage</td>
<td>approx. 1.1 m²/m²</td>
</tr>
</tbody>
</table>

**Multipor 4 x 4 mm reinforcement mesh**

Embedding the Multipor reinforcement mesh ...  
... and troweling over.

Multipor reinforcement mesh [25 or 50 m]
4.0 Multipor interior insulation systems

4.5 Using Multipor interior insulation systems with lightweight mortar

**Benefits:**
- Practical solutions for interior insulation without vapor barriers
- Vapor-permeable and capillary-active
- Compatible system components ensure overall system reliability
- Moisture-regulating with high reserves
- Safety of use – confirmed by over 20 years of practical experience
- Individual apartments/rooms can be refurbished step-by-step
- Non-combustible, entirely mineral-based
- Easy to process and install using standard construction tools
- Can be simply bonded to solid substrates – anchor fixings not normally required

Insulation applied to the inside of external walls is often the only option for upgrading the thermal insulation of elaborate or listed historic facades. Multipor or Multipor compact plus interior insulation systems can also be used in new buildings with exposed concrete facades, for example. Water-vapor-permeable, capillary-active Multipor interior insulation systems are ideal for insulating the inside of different solid wall materials, without the hassle of installing a vapor barrier.

<table>
<thead>
<tr>
<th>Thermal conductivity [rated value]</th>
<th>Board thickness [mm]</th>
<th>Multipor compact plus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>λ = 0.042 W/(mK)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>λ = 0.045 W/(mK)</td>
<td>0.667</td>
<td>0.889</td>
</tr>
</tbody>
</table>

Table 1: Multipor mineral insulation boards – dimensions and thermal resistance R [m²K/W]

External wall requirements

The wall to which the Multipor interior insulation system is applied must be protected from rising damp and moisture ingress. An effective vertical or horizontal barrier membrane is an essential requirement. These can be retrofitted by suitable means if necessary. Water under pressure (e.g. groundwater) poses a particular problem – and calls for an inspection of the building.

Protection against driving rain

DIN 4108-3 provides guidance for assessing whether the external facade offers sufficient protection against driving rain, which is part of the initial planning process. If resistance to driving rain cannot be determined unequivocally by this means, it is possible to conduct an initial water absorption test on external facades using a gauge known as a Karsten or Rilem tube. Further information can be found under the following link:

https://ktauniversity.com/wind-driven-rain-resistance-testing/

More detailed wall tests may then be required, depending on the results. Any damage or shortcomings found – e.g. defective joint mortar – must be rectified using carefully selected methods. Moisture-adaptive impregnation is one means of effectively protecting against driving rain, and must be renewed at specified intervals – in consultation with the manufacturer of the protective wall coating.
Further information and recommendations for assessment can be found in WTA Guidelines 6–4 “Interior insulation as per WTA I: Planning guide” (Innendämmung nach WTA I: Planungsleitfaden), 6–5 “Interior insulation as per WTA II: The use of numerical calculation methods to verify interior insulation systems” (Innendämmung nach WTA II: Nachweis von Innendämmssystemen mittels numerischer Berechnungsverfahren), 8–4 “Restoration of half-timbered constructions as per WTA IV: External cladding” (Fachwerkinstandsetzung nach WTA IV: Außenbekleidungen) and 8–5 “Restoration of half-timbered constructions as per WTA V: Interior insulation” (Fachwerkinstandsetzung nach WTA V: Innendämmung).

**Substrate**

Multipor interior insulation systems need a sufficiently even substrate to achieve a full-surface bond. The substrate must also be dry, load-bearing and free from residues that may hinder adhesion [1] [2].

Non-load-bearing old plaster, barrier membranes, coats of paint wallpapers etc. must be removed beforehand and defective areas repaired. Silicate paints, on the other hand, often provide a suitable substrate for bonding due to their silicifying properties. If the interior plaster is completely removed, a levelling layer may be needed in some circumstances – for example to fill large joint cavities. A ‘dubbing out’ coat of plaster can be applied to the existing substrate to level out larger areas of unevenness. Defects are best repaired and plastered with a CS II plaster mortar as per DIN EN 998-1 with a compressive strength of at least 1.5 to 5 N/mm², such as Multipor lightweight mortar for example. The plaster substrate must be carefully tested by the specialist contractor to verify its suitability for adhesion. Please contact your Multipor technical advisor for more information about surface testing.

Freshly plastered substrates need a defined drying period before Multipor mineral insulation boards can be applied. Please refer to the plaster manufacturer’s directions.

---

**Table 2: Assessment of substrates for interior insulation**

<table>
<thead>
<tr>
<th>Existing substrate</th>
<th>Measure</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smooth, fully mortared masonry</td>
<td>None</td>
<td>Remove dust, dirt and paint if necessary</td>
</tr>
<tr>
<td>Uneven substrate</td>
<td>Apply levelling plaster</td>
<td>CS II lime-cement plaster</td>
</tr>
<tr>
<td>Uneven or flaking old plaster</td>
<td>Level out or remove</td>
<td>If necessary, level with CS II lime-cement plaster</td>
</tr>
<tr>
<td>Lime or lime-cement plaster</td>
<td>None</td>
<td>Remove dust, dirt and flaking parts and patch if necessary</td>
</tr>
<tr>
<td>Gypsum plaster</td>
<td>Remove</td>
<td>Completely remove gypsum plaster</td>
</tr>
<tr>
<td>Old paint</td>
<td>Remove</td>
<td>Completely remove old paint (e.g. by sanding)</td>
</tr>
<tr>
<td>Wallpaper</td>
<td>Remove</td>
<td>Wash and scrape off, remove residual paste</td>
</tr>
<tr>
<td>Waterlogged masonry</td>
<td>Seal, leave to dry</td>
<td>Replace horizontal or vertical membrane, leave to dry out</td>
</tr>
<tr>
<td>Half-timbered wall with clay plaster on the inside</td>
<td>Level with clay plaster if necessary</td>
<td>Use clay plaster system (see Chapter 4.5)</td>
</tr>
<tr>
<td>Lightweight construction</td>
<td>Unsuitable substrate</td>
<td>Not suitable for Multipor insulation</td>
</tr>
<tr>
<td>Existing insulation (e.g. lightweight wood-wool boards or similar)</td>
<td>Remove</td>
<td>Remove old insulating materials, level with CS II lime-cement plaster if necessary</td>
</tr>
</tbody>
</table>
4.0 Multipor interior insulation systems

4.5 Using Multipor interior insulation systems with lightweight mortar

Construction site conditions
During the processing and setting of Multipor lightweight mortar the room temperature and surface temperature of the structure must not fall below > 5 °C. Relative humidity should not exceed 80%.

Components in contact with the ground
The floor and wall area of structural components adjacent to the ground must be permanently protected against rising damp and moisture penetration. This is normally done by applying a waterproof membrane to the outside of the building at the time of construction. The same applies to the base plate (sole plate). Bitumen or plastic sheeting is suitable for retrofit waterproofing.

Mixing Multipor lightweight mortar
Mix Multipor lightweight mortar (20 kg/bag) with the quantity of water indicated on the mortar bag. The Multipor bucket is graduated to make it easy to add the right quantity. To obtain a workable consistency we advise using a low-speed mixer with a long, sturdy paddle [3]. Leave the mixed mortar to stand for about 5 minutes before re-stirring. 20 kg of lightweight mortar combined with the required amount of water yields approximately 30 liters of fresh mortar.

Clean tools and mixers thoroughly after use or before long breaks to ensure optimal mixing and processing results [4].

Bonding Multipor mineral insulation boards
Using a 12-mm notched trowel, apply a full bed of Multipor lightweight mortar to the back of the Multipor mineral insulation board and comb to create an optimum adhesive bond [5–7]. Depending on the thickness of insulation, we recommend using different trowel sizes to obtain the right ridge thickness required for full-surface bond:

- 12-mm notched trowel for insulation thickness up to 140 mm
- 15-mm notch trowel for insulation thickness of 160 mm or above
Slight unevenness in the substrate can also be levelled out in this way. If necessary, Multipor mineral insulation boards can be laid wet-on-wet (buttering and floating method) to level out further uneven areas. The following points must be strictly observed when using vapor-permeable, capillary active systems such as Multipor or Multipor compact plus interior insulation:

- Bond with a full bed of Multipor lightweight mortar
- Slide and press the Multipor mineral insulation board into position correctly
- Mortar-free head and bed joints [12–14].

Larger tolerances in the substrate must be evened out with a suitable leveling plaster before starting the insulation work. Table 2 “Assessment of substrates for interior insulation” provides useful guidance on this subject.

Special care must be taken to ensure that the first course is plumb and level, allowing for any height differences in the adjacent floor construction. Structures like to exhibit different expansion or settling behavior (e.g. timber joist ceilings and floors) must be decoupled from the insulation board using Multipor hemp-felt insulation strips [8]. Bond the Multipor mineral insulation boards with a minimum joint offset of 15 cm using a full bed of Multipor lightweight mortar [9–11]. After applying the bonding mortar, position the Multipor mineral insulation boards on the wall surface and press down to ensure the entire surface is fully bonded. Only a full-surface bond will prevent warm, damp indoor air flowing behind the insulation and in addition to regulating humidity, it also guarantees the long-term performance of the interior insulation in terms of building physics. Figures [12–14] illustrate how the ridges of Multipor lightweight mortar should respond to ensure correct positioning of Multipor mineral insulation boards. It is not necessary to interlock the insulation boards with intersecting internal walls; they simply need to butt up tightly against one another. During subsequent reinforcement, do not run the mesh around internal corners.
4.0 Multipor interior insulation systems

4.5 Using Multipor interior insulation systems with lightweight mortar

Cutting and shaping
It is easy to cut Multipor mineral insulation board to fit the features of the room. Closers can also be quickly cut to size using a fine-toothed Multipor handsaw [15]. Small areas of unevenness can be sanded smooth with the Multipor sanding board before applying subsequent coatings [16][17]. Remove any sanding dust from the surface of the insulation boards before applying the reinforcement plaster, and re-prime the sanded area if necessary.

Solid intermediate floors
Vapor barriers between two storeys are unnecessary.

Floorboards on top of a timber-joist ceiling
Tongue-and-groove floorboards or engineered wooden boards may be laid on top of a timber-joist ceiling. When renovating old buildings, the structural condition of the timber joists and flooring should be checked and if necessary repaired before installing the insulation boards. There should be no give or spring in the floor (screw down loose floorboards).

Where possible, Multipor mineral insulation boards should be installed on the unfinished floor and the subsequently laid screed should be decoupled by inserting screed-edge insulation strips between the screed and the insulation boards. If it is not possible to lay the insulation boards on the unfinished floor, the first course must be laid straight on to the top edge of the finished floor, against the wall [the resulting thermal bridge created by the ceiling must be assessed at the planning stage – see Chapter 7.1.3]. The insulation must also be decoupled from flexible components (such as wooden flooring) using Multipor hemp-felt insulation strips [18].

Intersecting timber-joist ceilings must also be decoupled from Multipor mineral insulation boards at the point of intersection using the same decoupling strips. The strips absorb any vibrations from these components to prevent them transferring to the insulation.

Reinforcing the insulated wall
To reinforce the insulated surface, apply reinforcement plaster (Multipor lightweight mortar) with an average thickness of 5 mm to the entire surface using a 10-mm or 12-mm notched trowel. Then press in the alkali-resistant Multipor reinforcement mesh and work carefully into the upper third of the reinforcement layer [19][20].
Reinforcement: Multipor lightweight mortar approx. 3 to 4 kg/m² for a 5-mm layer thickness
Mesh: Multipor reinforcement mesh 4 x 4 mm approx. 1.1 m²/m² (overlap approx. 10 cm)

For additional reinforcement, use alkali-resistant armored mesh to increase the compressive strength of impact-prone areas of interior walls [e.g. stairwells, public buildings such as schools]. Embed the additional mesh in the Multipor lightweight mortar before the normal reinforcement layer, with the edges butting up rather than overlapping. Allow the armored reinforcement to dry before applying the normal reinforcement layer to the entire surface. This armored mesh can also be inserted before fitting edge protectors and expansion joint profiles.

Coatings
The surface of Multipor and Multipor compact plus interior insulation systems can be finished in various ways – for example plastering, painting or tiling. Clay plasters or plasterboard (drywall boards) are another option and offer great scope for creating decorative finishes.

Applying finishing plaster to the reinforcement layer
Apply a finishing coat of Multipor lightweight mortar or Multipor fine lime plaster [21] in a 2 to 3-mm layer thickness and smooth with a felted float before it sets [22] [23]. Multipor lime finishing plaster is applied in a 2-mm layer thickness and is suitable for a creating superior quality finish.

Once this is done, you can apply wallpaper or paint the walls with Multipor interior silicate paint. Alternatively, apply Class CS I/CS II CR finishing plaster to EN 998-1 or silicate textured plaster, e.g. Multipor silicate plaster, with a trowel ‘to grain thickness’ and texture when still wet [24]. Apply gypsum finishing plasters in a maximum layer thickness of 3 mm and lime or fine lime plasters in a 3 to 5-mm layer thickness. The total thickness of plaster...
[reinforcement layer and finishing plaster] should not exceed 8 mm. The plaster surfaces can then be finished with Multipor interior silicate paint. Allow the plaster to dry fully before painting.

Coverage:
- Finishing plaster with Multipor lightweight mortar: approx. 2 kg/m² for a 2 to 3-mm layer thickness
- Finishing plaster with Multipor smooth lime plaster: approx. 2 kg/m² for a 2-mm layer thickness (see Table 3)
- Please refer to the respective manufacturer’s technical data sheets for coverage of other suitable plasters.

Other mineral-based lightweight plasters can also be used as a finishing plaster, provided that they do not exceed compressive strength class CS II. As a basic rule, the finishing plaster should have a maximum thickness of 3 mm, the base plaster and reinforcing layer ≤ 8 mm and never thicker than the reinforcing layer underneath. It is also important to ensure that the finishing plaster bonds effectively with the Multipor lightweight mortar – it’s a good idea to conduct plaster tests beforehand to check this.

**Wallpaper**
Wallpapers can also be applied to Multipor insulation system for a decorative finish. We recommend the following types and materials:
- woodchip wallpapers
- embossed wallpapers
- printed wallpapers.

Under typical conditions in a home (20°C and average relative humidity 50% to maximum 60%), there are no restrictions in terms of building physics.

Woodchip, embossed and glass-fiber wallpapers should ideally be applied to a plaster substrate of Multipor lightweight mortar.

---

**Table 3: Multipor fine lime plaster/smooth lime plaster**

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Multipor fine lime plaster</th>
<th>Multipor smooth lime plaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength</td>
<td>CS II 1.5 – 5.0 N/mm²</td>
<td>&gt; 1.0 N/mm²</td>
</tr>
<tr>
<td>Water vapor permeability coefficient</td>
<td>µ ≤ 13</td>
<td>µ ≤ 25</td>
</tr>
<tr>
<td>Bulk density</td>
<td>1800 kg/m³</td>
<td>984 kg/m³</td>
</tr>
<tr>
<td>Building material class</td>
<td>A1; non-combustible</td>
<td>A1; non-combustible</td>
</tr>
<tr>
<td>Air and ambient temperature</td>
<td>≥ 5 °C</td>
<td>≥ 5°C</td>
</tr>
<tr>
<td>Processing time</td>
<td>approx. 70 – 110 min.</td>
<td>approx. 120 Min.</td>
</tr>
<tr>
<td>Delivery form</td>
<td>25 kg bag</td>
<td>20 kg bag</td>
</tr>
<tr>
<td></td>
<td>48 bags per pallet</td>
<td>48 bags per pallet</td>
</tr>
<tr>
<td>Storage</td>
<td>dry on pallet, approx. 12 months</td>
<td>dry, approx. 6 months</td>
</tr>
<tr>
<td>Water requirement per bag</td>
<td>approx. 5.5 – 6.0 l</td>
<td>approx. 8 – 9 l</td>
</tr>
<tr>
<td>Yield per bag</td>
<td>approx. 14 l fresh mortar; sufficient for approx. 5.0 m² in a 3-mm layer thickness</td>
<td>approx. 10 m² for a 2-mm layer thickness</td>
</tr>
<tr>
<td>Coverage per m²</td>
<td>approx. 5.0 kg/m² for a max. 3-mm layer thickness</td>
<td>approx. 2.0 kg/m² for a max. 2-mm layer thickness</td>
</tr>
</tbody>
</table>
Multipor fine lime plaster or Multipor smooth lime plaster is a more suitable substrate for finer quality wallpapers, depending on the quality of surface finish required (Q1 to Q4, see information sheet published by the German Gypsum Industry Association: “Plaster surfaces in interiors” [Putzoberflächen im Innenbereich]).

Paint
Various types of paint can be used. We generally recommend vapor-permeable silicate interior wall paint to DIN 18363 to avoid compromising the performance of the Multipor interior insulation system. Multipor interior silicate paint [25] is ideal for this purpose: It can be applied to Multipor fine lime plaster, Multipor lightweight mortar or any other mineral-based substrates to give a decorative interior finish. Free from preservatives and softeners, it prevents the growth of bacteria and fungi on the surface in a natural way. Supplied in ready-to-use 15-liter buckets, the paint just needs a quick stir before applying one or two coats with a brush, roller or airless sprayer [26] [27].

Undiluted coverage per coat is approx. 0.15 l/m² – depending on the absorption capacity and texture of the substrate.

With a particle size below 100 μm, the silicate paint gives a flat, matt finish which is naturally white.

Water-soluble, lime-fast pigments can be added for a colored finish.

Walls in rooms that don’t require a high quality decorative finish (e.g. underground garages, storerooms) can be painted directly with a brush, roller or sprayer – without adversely affecting the diffusion capability. Multipor interior silicate paint is ideal for enhancing the surface of Multipor mineral insulation boards, provided that any dust is removed before painting. Hairline cracks occasionally develop across board joints if Multipor lightweight mortar is applied directly to the insulation boards as a thin skim coat without the necessary reinforcement mesh.

Practical tip: Mineral-based finishing render and paints ideally complement Multipor mineral insulation systems.

Plasterboards (drywall boards)
Fasten the framing for this type of surface finish – timber battens for example – to the load-bearing substrate through the Multipor mineral insulation boards using suitable fixing devices. First smooth any raised areas in the head and bed joints with a sanding board.

Then fasten the plasterboard to the timber battens. Follow the plasterboard manufacturer’s instructions at each stage. When the plasterboards are fastened to the framing, a cavity is created within the stud wall which is ideal for accommodating service installations such as wiring, cavity wall sockets, pipework etc. Since the cavity is located immediately in front of the fully bonded insulating layer, warm damp indoor air is prevented from flowing behind the insulation. Consequently, it has no adverse effect on the insulation’s performance in terms of building physics.

Surface finishes for plasterboard
Please contact the plasterboard manufacturer for information about suitable surface finishes. We recommend using vapor-permeable coatings to ensure the long-term performance of the interior insulation.

Wet rooms and waterproofing / using a vapor barrier
Domestic kitchens and bathrooms, like living rooms and offices, are classed as ‘dry rooms’ in accordance with DIN 4108-3. When used as intended and with appropriate heating and ventilation, the average relative humidity is not significantly higher than in living areas, so in most cases additional waterproofing is not required. In areas subject to splashing – for example behind baths or in shower cubicles – a liquid sealant must be applied to the existing layer of reinforcing plaster in accordance with approved codes of practice and the ZDB information sheet below. ZDB stands for Zentralverband Deutsches Bauge- werbe and is the umbrella organization of the German construction industry.
Further information can be found in the latest version of the ZDB information sheet “Waterproof seals used in conjunction with tiles and panels” (Abdich- tungen im Verbund mit Fliesen und Platten).

These guidelines do not apply to areas subject to heavy moisture loads (commercial wet rooms, catering kitchens, spa/wellness areas and swimming pools). In such cases, individual non-steady-state simulations are essential to verify the hygrothermal performance of the overall structure (see “Insulation Checklist” in the download area of our website at www.multipor.com).

Anchor fixings in special situations

Multipor mineral insulation boards applied to a substrate suitable for adhesion do not generally require anchor fixings. One exception is sandy old plaster which has been consolidated with a silicate primer. In this case, a Multipor screw-in anchor (plate diameter ≥ 60 mm) must be screwed through the middle of the insulation board into the load-bearing substrate to ensure full-surface bonding [28].

Tiling Multipor interior insulation systems

Multipor mineral insulation boards can generally be tiled, provided that the substrate is load-bearing and suitable for adhesion [29]. The reinforcement layer must be additionally secured by inserting screw-in anchors (plate diameter ≥ 60 mm) wet-on-wet through the mesh into the load-bearing substrate. A smooth, level substrate is particularly important for large-format tiles or stoneware panels (e.g. 60 x 60 cm). This will ensure that the tiles are fully supported and securely retained.
The following points should be considered when tiling Multipor interior insulation systems:

- max. tile weight 25 kg/m²
- anchor fixing with plate diameter ≥ 60 mm for insulation
- number of anchors: approx. 4 per m² wet-on-wet through the reinforcing layer.

We recommend fixing tiles in a thin bed of flexible adhesive and using a flexible grout. Multipor compact plus insulation is not suitable for tiling.

We recommend tiling only 2/3 to maximum 3/4 of the way up the wall to retain the moisture-regulating function of the wall.

Reveals

Multipor reveal boards are ideal for insulating a wide variety of reveals. Apply a full bed of Multipor lightweight mortar to the Multipor reveal board with a 12-mm notched trowel and comb though.

The height of the troweled ridge should be around 10 mm. It is important to avoid butting the reveal insulation boards tightly up to the window or door frames. Instead, insert suitable flexible decoupling profiles (e.g. Multipor plaster-stop beads). This helps to prevent subsequent cracking [31] [32].

Insulating wedges

To reduce thermal bridging, interconnecting interior walls can be insulated to a depth of approx. 50 cm where they insect with the external wall. Multipor mineral insulation board or a Multipor insulating wedge, which is processed in the same way as the mineral insulation board, can be used for this purpose. The wedge does not have to dovetail with the insulation boards on the inside of the external wall [33] [34].

Electrical installations

Interior insulation systems improve the heat retention of poorly insulated external walls. To prevent thermal bridging, it is best to avoid routing electrical switches, wiring and sockets through the insulation. Instead, they should be installed in less sensitive areas such as internal walls. Surface-mounted systems (cable ducts/skirting boards) are also possible. If these options are undesirable or unfeasible, the following points must be borne in mind before carrying out the actual insulation work:

- Note the exact position of switch boxes, distribution boxes and socket outlets
- Route wiring and fixtures for new installations in the existing wall or on the substrate.

Practical tip: Heating and water pipes should be considered separately during the design stage.

If cables are routed on the existing wall, cut a chase in the back of the Multipor mineral insulation boards before installing [35] [36].
4.0 Multipor interior insulation systems

4.5 Using Multipor interior insulation systems with lightweight mortar

We recommend using the new Multipor interior insulation sockets to securely fix switches, sockets and other devices to exterior walls insulated on the inside without thermal bridging [37] [38]. They are designed specifically for use in vapor-permeable Multipor interior insulation systems with an insulation thickness of 30 to 100 mm.

Benefits:
- Designed to be installed in insulated interior walls
- Thermal bridge-free installation guaranteed
- Moisture-regulating and insulating at the same time
- Prevent moisture-related structural damage.

The Institute of Building Climatology at the TU Dresden has conducted extensive building materials testing which confirms the performance of Multipor interior insulation sockets. The study shows that the new interior insulation socket prevents hygrothermally induced damage.

The Multipor socket extension kit, which consists of a mounting plate and an extension ring [39], is another proven option. It is designed to ensure secure fastening to the insulated substrate. The length can be extended in 5 mm increments to suit the insulation thickness, making it particularly suitable for existing installations. The socket kit extends existing device and junction boxes to enable socket outlets, for example, to be securely fastened to retrofitted insulation.

Fill any gaps between the socket and the insulation with Multipor filler. Then apply the chosen final surface finish, as described above.

Electrical installations must be fastened to a load-bearing substrate [40]. Switch boxes, distribution boxes, socket outlets and other electrical devices must be securely mechanically fastened to the existing wall using mounting plates and extensions before carrying out the insulation work [41] [42].

Fill any gaps between the socket and the insulation with Multipor filler. Then apply the chosen final surface finish, as described above.

Electrical installations must be fastened to a load-bearing substrate [40]. Switch boxes, distribution boxes, socket outlets and other electrical devices must be securely mechanically fastened to the existing wall using mounting plates and extensions before carrying out the insulation work [41] [42].
Multipor telescopic device mounts and Multipor telescopic device boxes can also be steplessly adjusted to suit the insulation thickness. Electrical devices can then be mounted securely with ease [43] [44].

We do not advise mounting electrical sockets and cables directly to Multipor mineral insulation boards since this is not generally considered a proper and secure method of installation. In the case of plasterboard, fasten electrical installations to the stud wall and route cables in the cavity in front of the insulation board.

Other fittings: Insulating roller shutter boxes
After windows, roller shutter boxes are the main cause of significant heat loss in old buildings, often associated with drafts due to outdated construction methods. Since roller shutter boxes are generally poorly insulated and insufficiently airtight, if at all, they create thermal bridges which significantly increased heating costs. In construction terms, roller shutter boxes should be considered part of the wall, because they separate the indoor and outdoor climate.

Although they account for a relatively small percentage of the overall wall surface, in terms of energy performance they are the weakest component.

With attention increasingly turning to roller shutter boxes within the context of energy efficient refurbishments, well-known manufacturers now offer suitable interior remediation systems for virtually any roller shutter situation. Your Multipor technical adviser will gladly advise you in this matter.

Mounting radiators
Radiator recesses originally had an aesthetic function. Since old-fashioned radiators were very deep, the recesses prevented them projecting too far into the living space. However, these recesses reduced the thickness of the external wall, creating a ‘design-related’ thermal bridge which allowed heat to flow outside more quickly than via the remaining building envelope. Up to 6% of heat energy can be lost via this weak spot alone. To improve energy performance in these areas, the recesses can be initially filled in with Ytong precision blocks during renovation work.

The newly installed radiators can then be fastened directly to the solid Ytong precision block using suitable wall anchors. Failing this, it is a good idea to insulate the radiator recesses with Multipor interior insulation systems of a suitable thickness and connect them to the remaining wall surface.
### Multipor interior insulation systems

#### 4.5 Using Multipor interior insulation systems with lightweight mortar

If the recesses are sealed with Multipor interior insulation systems, make sure that the anchor fixings for the radiators pass through the insulation into the load-bearing substrate. There are several ways of doing this:

- Extend the existing brackets by the thickness of the insulation.
- Fit brackets to the interior insulation by screwing them through the insulation to the load-bearing substrate using suitably sized fasteners.
- Fasten new telescopic brackets to the existing wall and fit insulation round them.
- Mount the radiators on the floor.

In areas subject to increased loading, for example in schools or discotheques, we recommend using angle brackets or floor-mounting the radiators.

VDI Standard 6036 “Fasteners of radiators - requirements for planning and design” provides more detailed information on this subject. It is advisable to choose a suitable fastening option on the basis of this standard. Reputable radiator manufacturers are also a useful source of help.

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**Table 4: Consumption of basic components**

<table>
<thead>
<tr>
<th>Material</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic components</strong></td>
<td></td>
</tr>
<tr>
<td>Multipor mineral insulation board</td>
<td>4.3 boards/m²</td>
</tr>
<tr>
<td>Multipor compact plus mineral insulation board</td>
<td>5.2 boards/m²</td>
</tr>
<tr>
<td>Multipor lightweight mortar (adhesive)</td>
<td>approx. 3.5 kg/m² for a max. 5 mm layer thickness</td>
</tr>
<tr>
<td>Multipor lightweight mortar (reinforcement)</td>
<td>approx. 3.5 kg/m² for a max. 5 mm layer thickness</td>
</tr>
<tr>
<td>Multipor reinforcement mesh</td>
<td>approx. 1.1 m²/m²</td>
</tr>
<tr>
<td><strong>Alternative components</strong></td>
<td></td>
</tr>
<tr>
<td>Multipor lightweight mortar (finishing plaster)</td>
<td>approx. 2.5 kg/m² for a max. 5 mm layer thickness</td>
</tr>
<tr>
<td>Multipor screw-in anchor</td>
<td>4.3 units/m²</td>
</tr>
<tr>
<td>Multipor reveal boards</td>
<td>1.66 units/lm</td>
</tr>
<tr>
<td>Multipor insulating wedge</td>
<td>2.56 units/lm</td>
</tr>
<tr>
<td>Multipor smooth lime plaster</td>
<td>approx. 2.0 kg/m² for a max. 2 mm layer thickness</td>
</tr>
<tr>
<td>Multipor fine lime plaster</td>
<td>approx. 5.0 kg/m² for a max. 3 mm layer thickness</td>
</tr>
<tr>
<td>Multipor interior silicate paint</td>
<td>approx. 0.3 l/m²</td>
</tr>
</tbody>
</table>
Using Multipor interior insulation systems with clay mortar

Eco-friendly, healthy and climate-regulating. Environmentally compatible solutions are particularly important for refurbishment projects – and Multipor clay mortar and a suitable Multipor clay paint are ideal for this purpose.

The Multipor interior insulation system with clay mortar can be used as interior wall insulation for energy-efficient refurbishments and as interior plaster systems on masonry such as Ytong autoclaved aerated concrete and Silka calcium-silicate blocks when a health-conscious approach to modernization is required.

Consisting of a blend of powdered clay and natural sand, Multipor clay mortar conforms to current regulations for building with clay and to DIN 18947 “Earth plasters” (see Table 1).

The fact that it dries purely by mechanical means, can be reused and contains no chemical additives qualifies it as a healthy building material. Furthermore, with high capillary conductivity, it absorbs and distributes moisture to speed up the drying process.

Multipor clay mortar can be used in a wide variety of ways:
- Single or multi-layer levelling plaster up to 40 mm layer thickness for uneven substrates
- Adhesive mortar for Multipor mineral insulation boards, in accordance with the relevant directions for use
- Reinforcement plaster with mesh insert on Multipor mineral insulation boards
- Interior plaster on Multipor mineral insulation boards, Ytong AAC masonry and Silka calcium-silicate masonry
- Wall heating plaster in accordance with manufacturer’s instructions.

It is very easy to use and, as a 100% natural material, can be remixed time and again: If the material sets to soon, just add more water and mix again to reproduce a workable consistency. Any remaining mortar can be stored indefinitely, and is also fully compostable.

Refurbishing half-timbered buildings
Another important area of application for Multipor clay mortar is the refurbishment of half-timbered buildings. Combined with Multipor mineral insulation boards, the two materials complement other perfectly, having the ideal building physical properties for creating an optimum indoor climate while at the same time protecting historic, listed wall structures. Clay mortar has traditionally been used to protect the timber components of half-timbered buildings thanks to its ability to rapidly remove moisture. Further processing instructions and data sheets are available in the download section of our website at www.multipor.com

Multipor clay mortar can also be used as interior plaster on numerous surfaces (both in new build- ings and refurbishment projects). Apply a 3 to 5-mm layer of clay mortar to the dried substrate and smooth with a trowel or sponge float to the desired texture. With good ventilation, the mortar sets well enough within 3 to 5 days for the surface finish to be applied.

Multipor clay mortar

Natural clay
Ecological Multipor clay paint is the perfect partner for Multipor clay mortar.
Two to three coats of this natural, solvent-free, clay-based wall paint, applied with a brush or roller, is sufficient to create a white, vapor-permeable and therefore breathable decorative finish for interior walls and ceilings. Mineral-based stains and pigments can be added to create different color and textural effects.

**Special benefits for healthy living**

In brief, the Multipor interior insulation system with clay mortar is an ecological and environmentally friendly solution for surface finishes and energy efficient refurbishments. Healthy products – also suitable for allergy sufferers – can be applied to a wide variety of substrates to significantly enhance comfort and quality of life.

**Multipor 7x7 mm reinforcement mesh**

7 x 7 mm reinforcement mesh (see Table 2) has been designed specifically for use with Multipor interior insulation systems with clay mortar. Embed it gently into the upper third of the freshly applied Multipor clay mortar, taking care to overlap the joints by at least 10 cm. Coverage: 1.10 m²/m². The mesh is available in 1 m wide rolls and 25 or 50 m lengths.

**Bonding Multipor mineral insulation boards with clay mortar**

Mix the Multipor clay mortar with approx. 6 l of water per bag (25 kg) to a smooth, uniform consistency using a suitable mixer [1]. Bond Multipor mineral insulation boards to the substrate in a staggered pattern using a full bed of Multipor clay mortar. Apply a full bed of clay mortar to the back of the Multipor insulation board with a notched trowel (12-mm notch) and comb [2].

---

**Table 1: Technical data for Multipor clay mortar manufactured to DIN 18947/LPM-0/0.8 m - 5 II - 2.0**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal conductivity</td>
<td>$\lambda = 1.0 \text{W/(mK)}$</td>
</tr>
<tr>
<td>Water vapor permeability coefficient</td>
<td>$\mu = \leq 11$</td>
</tr>
<tr>
<td>Heat capacity</td>
<td>$1.0 \text{kJ/kgK}$</td>
</tr>
<tr>
<td>Bulk density</td>
<td>$2.042 \text{kg/m}^3$</td>
</tr>
<tr>
<td>Shrinkage</td>
<td>$1.9 %$</td>
</tr>
<tr>
<td>Flexural strength</td>
<td>$0.70 \text{N/mm}^2$</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>$1.5 \text{N/mm}^2$</td>
</tr>
<tr>
<td>Equilibrium moisture content, wt%</td>
<td>$2.0 - 4.5 %$</td>
</tr>
<tr>
<td>Building material class</td>
<td>A1; non-combustible</td>
</tr>
<tr>
<td>Processing temperature</td>
<td>$\geq 5 \degree\text{C}$</td>
</tr>
<tr>
<td>Storage</td>
<td>Indefinite if properly stored on dry pallet</td>
</tr>
<tr>
<td>Delivery form</td>
<td>25 kg bag 48 bags per pallet</td>
</tr>
</tbody>
</table>

**Table 2: Technical data for Multipor reinforcement 7 x 7 mm mesh**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammage</td>
<td>105 +/- 5 g/m²</td>
</tr>
<tr>
<td>Mesh width</td>
<td>7 x 7 mm</td>
</tr>
<tr>
<td>Strength</td>
<td></td>
</tr>
<tr>
<td>- on delivery</td>
<td>$\geq 1750 \text{N/5 cm}$</td>
</tr>
<tr>
<td>- after ageing</td>
<td>$\geq 50 % \text{und} \geq 1000 \text{N/5 cm}$</td>
</tr>
<tr>
<td>Roll size</td>
<td>1 m</td>
</tr>
<tr>
<td>- width</td>
<td>25 or 50 m</td>
</tr>
<tr>
<td>Coverage</td>
<td>approx. 1.1 m²/m²</td>
</tr>
</tbody>
</table>
After combing, the troweled ridges should be at least 10 mm high. The existing wall surface can also be prefilled with clay mortar to a maximum depth of 10 mm using a smoothing trowel prior to fitting the insulation board wet-on-wet. After applying the clay mortar, position the Multipor mineral insulation board on the wall and press down firmly [3]. This ensures a thin adhesive bond and complete mortar coverage. Butt the head and bed joints of the Multipor mineral insulation boards up tightly rather than mortaring them [4].

Special care must be taken to ensure that the first course is plumb and level, allowing for any height differences in the adjacent floor construction. If structures are likely to exhibit different expansion or settling behavior, they should be decoupled from adjacent components with Multipor hemp-felt insulation strips.

Closers for Multipor mineral insulation boards can be cut to any size using a fine-toothed Multipor handsaw.

Practical tip: You can add more water repeatedly to dried out Multipor clay mortar to achieve the required consistency.

Reinforcement plaster/base plaster
To use Multipor clay mortar as a reinforcing layer, mix to a workable consistency by adding approx. 4.5 l of water per bag. Note that reinforcement plaster requires less water than adhesive plaster. Then comb the Multipor clay mortar onto the surface of the insulation board with a 12-mm notched trowel [5]. The troweled ridges should be around 10 mm high. Then embed reinforcement mesh with a mesh width of 7 x 7 mm into the upper third of the reinforcement plaster. Once troweled smooth, this gives an average layer thickness of 5 mm [6].

Installing anchor fixings
Multipor mineral insulation boards generally require mechanical fastening when Multipor clay mortar is used as the adhesive in energy-efficient refurbishments. This is done using thermally decoupled screw fasteners with plate head [minimum 60 mm diameter].
In the case of half-timbered buildings, screw-in anchors should be inserted in the timber frame to avoid damaging the space in between. Use at least four Multipor screw-in anchors per m². We recommend using one anchor per board on all free edges (e.g. window recesses). Interlock the insulation boards where they intersect at corners.

**Screwing in the anchors**
- Screw-in anchors are normally inserted in the middle of the board.
- If the plaster is >10 mm thick (reinforcement and base coat), insert the screw-in anchors through the reinforcement layer wet-on-wet [7]. Slit a cross in the reinforcement mesh with a knife before inserting the screw.
- If wall heating is to be installed on walls insulated with Multipor mineral insulation boards, insert the anchors screws through the reinforcement layer wet-on-wet after plastering in the wall heating pipes. For more detailed guidance, please refer to our technical information on wall heating which you can find on the download section of our website at [www.multipor.com](http://www.multipor.com).

**Multipor clay mortar as finishing plaster**
Multipor clay mortar can be applied to prepared, dry substrates as a decorative finish. Apply a 3 to 5-mm layer of Multipor clay mortar to the existing reinforcing layer with a notched trowel [8] and then smooth with a trowel or sponge float to the desired texture [9].

**Surface finish/paint**
The surface can be painted as soon as the finishing plaster is dry [10] – we recommend using our Multipor clay paint which we supply as white powder paint in 2 or 8 kg sacks. To obtain the right consistency for the substrate, add water in a ratio of no more than 1:10 and stir well with a mechanical mixer – then it’s ready for immediate use. The paint is easy to apply with a brush or roller. Apply two to three coats to ensure complete coverage, allowing three hours’ drying time between coats under normal ambient conditions.

**Practical tip:** Shrinkage and drying cracks may occur on clay plastered surfaces, depending on the material. These emphasize the natural character of Multipor clay mortar. They do not constitute a defect and can easily be rectified by lightly dampening the affected area (e.g. using a spray bottle) and closing them back up again with a float.

Commercially available mineral tints and pigments can be added to our Multipor clay paint to achieve the desired color.
Multipor interior insulation systems

Using Multipor interior insulation systems with clay mortar

Supplementary notes

When improving the energy performance of buildings, consideration must be given to the avoidance of thermal bridging where components connect (e.g. walls and ceilings). Connections should be included in the assessment from an early stage as part of the planning process. The product range for Multipor clay-based interior insulation systems includes suitable companion products such as Multipor reveal boards and insulating wedges.

**Building physics in half-timbered structures**

Upgrading the energy performance of half-timbered buildings often represents a major problem for planners and building contractors since it requires a great deal of specialist knowledge and expertise, particularly with regard to assessing the hygrothermal performance.

Multipor provides a “Checklist for insulating the inside of half-timbered buildings” in the download section of our website at www.multipor.com.

Once completed, the checklist can be used to carry out a realistic analysis of hydrothermal interactions within the building. We perform this service on request.

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### Table 3: Recommended coverage

<table>
<thead>
<tr>
<th>Multipor clay mortar to DIN 18947</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery form</strong></td>
</tr>
<tr>
<td><strong>Yield per bag</strong></td>
</tr>
<tr>
<td><strong>Water requirement per bag</strong></td>
</tr>
<tr>
<td><strong>Bonding</strong></td>
</tr>
<tr>
<td><strong>Reinforcement</strong></td>
</tr>
<tr>
<td><strong>Finishing plaster</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Multipor clay paint (powder paint)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery form</strong></td>
</tr>
<tr>
<td><strong>Quantity of water required</strong></td>
</tr>
<tr>
<td><strong>Materials requirement per coat</strong></td>
</tr>
<tr>
<td><strong>Drying time</strong></td>
</tr>
</tbody>
</table>
Reference building

Half-timbered building, Soest

- Total energy-efficient refurbishment of a stripped out half-timbered building
- Multipor interior insulation system with clay mortar used throughout
- Multipor clay mortar used as levelling plaster, adhesive and reinforcement layer and finishing plaster
- Multipor clay paint as high quality surface finish
- Satisfies stringent requirements for environmentally friendly and healthy construction methods and material

<table>
<thead>
<tr>
<th>Project data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building type</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Application</td>
</tr>
<tr>
<td>Products used</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Reference building

Half-timbered building, Warendorf

- Preservation of listed facade
- Multipor interior insulation system with clay mortar used throughout
- Multipor clay mortar used as levelling plaster, adhesive and reinforcement layer and finishing plaster
- Satisfies KfW Efficiency House Standard for listed buildings
- Satisfies stringent requirements for environmentally friendly and healthy construction methods and materials

### Project data

<table>
<thead>
<tr>
<th>Building type</th>
<th>Half-timbered house</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Warendorf</td>
</tr>
<tr>
<td>Application</td>
<td>Interior insulation with clay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Products used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multipor mineral insulation board</td>
</tr>
<tr>
<td>Multipor clay mortar</td>
</tr>
</tbody>
</table>
4.0 Multipor interior insulation systems

4.7 Insulating air ducts with Multipor interior insulation systems

4.7 Insulating air ducts with Multipor interior insulation systems

- Quick, cost-effective adhesive installation
- Non-combustible, A1-rated material in compliance with DIN EN 13501-1
- Does not generate smoke, burning droplets or toxic gases in the event of fire
- Purely mineral-based, free from fibers and harmful substances
- Pressure-resistant and deformation-free
- Dimensionally stable, no bowing or shrinkage
- Safe, ecologically certified building material

Modern buildings are increasingly fitted with intelligent ventilation and air conditioning technology. The fresh air supply for these systems is usually drawn in via suitably sized air ducts, and then distributed around the building after treatment. Residual heat is recovered from the used air before it is fed back outside via other air ducts.

In large buildings (office complexes, hospitals, function rooms), these air ducts can be substantial. To mitigate heat loss in adjacent rooms, air ducts can be insulated or reduced to a non-critical size.

Due to its ecological properties, the Multipor interior insulation system (see Table 1) is ideal for this purpose. As well as being resistant to pests, the high alkalinity of the product effectively inhibits mold growth. Furthermore, Multipor is non-toxic and solvent-free.

The latest certificate from the eco-INSTITUT in Cologne confirms the ecological properties of Multipor mineral insulation boards and Multipor lightweight mortar:

- The indoor air contains no harmful VOC concentrations (VOC stands for volatile organic compounds)

### Table 1: Technical data for Multipor mineral insulation board and Multipor lightweight mortar

<table>
<thead>
<tr>
<th></th>
<th>Multipor mineral insulation board</th>
<th>Multipor lightweight mortar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulations</td>
<td>National technical approval Z-23.11-1501 European technical assessment ETA-05/0093</td>
<td>Lightweight mortar LW as per EN 998-1</td>
</tr>
<tr>
<td>Dry bulk density</td>
<td>85–95 kg/m³</td>
<td>approx. 770 kg/m³</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>≥ 200 kPa</td>
<td>CS II; 1.50–5.0 N/mm²</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>$\lambda = 0.042 \text{ W/(mK)}$ [design value]</td>
<td>$\lambda_{10, \text{dry}} = 0.18 \text{ W/(mK)}$</td>
</tr>
<tr>
<td>Water vapor diffusion resistance factor</td>
<td>$\mu = 2$</td>
<td>$\mu \leq 10$</td>
</tr>
<tr>
<td>Building material class</td>
<td>A1; non-combustible</td>
<td>A2-s1, d0; non-combustible</td>
</tr>
<tr>
<td>Dimensions/delivery quantity</td>
<td>600 x 390 mm \ d = 60 – 300 mm [in increments of 20] special format d = 50 mm with $\lambda = 0.045 \text{ W/(mK)}$</td>
<td>20 kg/bag</td>
</tr>
</tbody>
</table>
Please refer to VDI Standard 6022 for more information about hygiene requirements for ventilation and air conditioning systems. Part 3 of this standard defines the structural, technical and organizational measures required for the design, manufacture, installation, operation and maintenance of heating, ventilation and air conditioning systems (HVAC systems).

The maximum air velocity in the air duct has a major bearing on the design of the surface finish. In some cases, it may be up to 30 m/s (108 km/h) and certain measures must be put in place to allow for this.

Table 3 lists a range of air velocities with corresponding construction guidance.

### Using Multipor interior insulation system for air ducts

The instructions for using the Multipor interior insulation system and Multipor ceiling insulation system must be complied with.

The individual components of the Multipor interior insulation system for insulating air ducts are carefully matched to ensure the greatest possible degree of system safety, combined with easy processing and installation.

With this logical system, it is possible to eliminate thermal bridging at adjacent components/rooms or reduce them to a non-critical level.

Make sure that the substrate of the supply and exhaust air ducts is load-bearing and suitable for adhesion. Remove any mold oil residues or other components that may inhibit adhesion.

Smooth down any rough areas on the surface to be insulated to ensure full-surface adhesion. Level out uneven areas with a depth of up to 3 mm using the combed bed method.

Always apply the adhesive to the Multipor mineral insulation boards. Substrate unevenness to a maximum of 5 mm can be rectified using the buttering-and-floating method – in this case the adhesive is applied both to the Multipor mineral insulation boards and the substrate to be insulated.

Apply a full bed of Multipor lightweight mortar to the back of the board with a 12-mm notched trowel (use a 15-mm notched trowel for boards with a thickness of 160 mm and above). Set the mortared board onto the surface to be insulated.

Uneven areas in the insulated surface can easily be smoothed out with the Multipor sanding board.

### Table 2: Technical data for Multipor reinforcement 4 x 4 mm mesh

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammage</td>
<td>160 +/- 5 g/m²</td>
</tr>
<tr>
<td>Mesh width</td>
<td>4 x 4 mm</td>
</tr>
<tr>
<td>Strength</td>
<td></td>
</tr>
<tr>
<td>- on delivery</td>
<td>&gt;= 1750 N/5 cm</td>
</tr>
<tr>
<td>- after aging [ETAG 004]</td>
<td>&gt;= 50 % and &gt;= 1000 N/5 cm</td>
</tr>
<tr>
<td>Roll size</td>
<td></td>
</tr>
<tr>
<td>- width</td>
<td>1 m</td>
</tr>
<tr>
<td>- length</td>
<td>25 or 50 m</td>
</tr>
<tr>
<td>Coverage</td>
<td>approx. 1.1 m²/m²</td>
</tr>
</tbody>
</table>

*Alkali-resistant glass fiber mesh for internal and external use, white*

Grammage 160 +/- 5 g/m²
Mesh width 4 x 4 mm
Strength - on delivery >= 1750 N/5 cm
- after aging [ETAG 004] >= 50 % and >= 1000 N/5 cm
Roll size - width 1 m
- length 25 or 50 m
Coverage approx. 1.1 m²/m²
### Additional guidance notes on air duct insulation

If airflow speeds inside the ventilation shafts do not exceed 10 m/s, the surface of the Multipor mineral insulation boards can simply be painted with Multipor interior silicate paint. Use a roller or sprayer to apply the paint to the insulation boards (two coats).

For airflow speeds up to 20 m/s, we advise skimming the boards with Multipor lightweight mortar in a thickness of approx. 3 mm. In this case, mesh reinforcement is not strictly necessary, but will increase the resistance.

For airflow speeds up to max. 30 m/s, mechanical fasteners are additionally required. These must be screwed through the reinforcement layer (wet-on-wet) into the load-bearing substrate and the anchor plate must also be skimmed. Build up the layers as follows:

- Bond Multipor mineral insulation board to the load-bearing substrate with Multipor lightweight mortar
- Reinforce the surface of the insulation board with Multipor lightweight mortar and reinforcement mesh, including wet-on-wet mechanical fastening with Multipor screw-in anchors. Slit a hole in the mesh first with a sharp knife.
- Apply the final coating as required (either Multipor lightweight mortar, Multipor fine lime plaster or Multipor smooth lime plaster for a smooth finish)
- Apply Multipor interior silicate paint if required.

#### Quality of surface finish for air duct insulation

Multipor lightweight mortar and Multipor fine lime plaster applied to the reinforcement layer of Multipor lightweight mortar satisfy the requirements for a Q2 grade surface finish.

Multipor smooth lime plaster (see Table 4) applied to the Multipor lightweight mortar reinforcement layer can satisfy the requirements for a Q3 surface finish.

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### Table 3: Insulation of air ducts with Multipor mineral insulation board

<table>
<thead>
<tr>
<th>Airflow speed</th>
<th>Construction/surface</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10 m/s</td>
<td>□ Apply fully mortared Multipor mineral insulation board □ Paint surfaces with Multipor interior silicate paint</td>
<td>□ Apply paint with roller or airless sprayer □ Two coats of paint are normally required</td>
</tr>
<tr>
<td>up to 20 m/s</td>
<td>□ Apply fully mortared Multipor mineral insulation board □ Apply an additional skim coat of Multipor lightweight mortar □ Finish with Multipor interior silicate paint if required</td>
<td>□ Skim coat thickness approx. 3 mm (hairline cracking may occur where the insulation boards join) □ Additional mesh reinforcement increases surface strength and minimizes the risk of hairline cracking</td>
</tr>
<tr>
<td>up to max. 30 m/s</td>
<td>□ Apply fully mortared Multipor mineral insulation board □ Mechanically fasten the Multipor mineral insulation boards by inserting anchors screws through the reinforcement layer wet-on-wet □ Always use Multipor lightweight mortar for reinforcement □ Use Multipor lightweight mortar, Multipor fine lime plaster or Multipor smooth lime plaster for the finishing coat □ Finish with Multipor interior silicate paint if required</td>
<td>□ Use Multipor screw-in anchors with a plate diameter of at least 60 mm □ Insert mesh in the reinforcing layer □ Fit one anchor per Multipor mineral insulation board □ Select the anchor based on the fire protection requirements for the building concerned</td>
</tr>
</tbody>
</table>
The maximum plaster thickness (reinforcement and finishing plaster) is 8 mm. If construction requirements call for thicker plaster, it is essential to provide additional mechanical fastening by inserting Multipor screw-in anchors through the reinforcement layer when still wet. The maximum surface load should be determined in consultation with your Multipor technical adviser.

If the surface of the insulation boards has to be sanded down, remove any dust and loose fragments before applying any further coatings (e.g. with a fine brush). However, it is not necessary to prime the surface before applying Multipor lightweight mortar. Multipor interior silicate paint can also be applied without further substrate preparation.

**Practical tip:** The hygiene requirements of ventilation and air conditioning systems are described in VDI Standard 6022.

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### Table 4: Technical data for Multipor smooth lime plaster

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength</td>
<td>&gt; 1.0 N/mm²</td>
</tr>
<tr>
<td>Water vapor permeability coefficient</td>
<td>µ ≤ 25</td>
</tr>
<tr>
<td>Bulk density</td>
<td>984 kg/t</td>
</tr>
<tr>
<td>Building material class</td>
<td>A1; non-combustible</td>
</tr>
<tr>
<td>Air and ambient temperature</td>
<td>≥ 5 °C</td>
</tr>
<tr>
<td>Processing time</td>
<td>approx. 120 Min.</td>
</tr>
<tr>
<td>Delivery form</td>
<td>20 kg/bag, 48 bags per pallet</td>
</tr>
<tr>
<td>Storage</td>
<td>dry, approx. 6 months</td>
</tr>
<tr>
<td>Water requirement per bag</td>
<td>approx. 8–9 l/bag</td>
</tr>
<tr>
<td>Yield per bag</td>
<td>approx. 10 m² for a 2-mm layer thickness</td>
</tr>
<tr>
<td>Coverage per m²</td>
<td>approx. 2.0 kg/ m² for a 2-mm layer thickness</td>
</tr>
</tbody>
</table>

---

**Weathering**

Areas subject to indirect weathering (transition to outside air) must be protected by a metal plate or similar. Areas directly exposed to weathering must be treated in the same way as Multipor ETICS mineral insulation board, i.e. the Multipor mineral insulation boards must be fully bonded and additionally fastened with one screw-in anchor per insulation board, inserted beneath the mesh into the load-bearing substrate. For airflow speeds of 20 to 30 m/s, fasten anchor fixings through the mesh. The surface coating always consists of mesh-reinforced base plaster, followed by finishing plaster and then paint.

**Accessible walkways (floors of inspection areas)**

If air ducts have to be accessed on foot, the insulation boards must be protected with additional boarding and the adjacent insulation must be finished accordingly.

Cement-bonded lightweight boards with a laminated structure are suitable for this purpose, laid horizontally over the full surface. Bond the boards in a full bed of Multipor lightweight mortar and butt up tightly together. Fill any gaps between individual panels with Multipor lightweight mortar. Cut boards to size with a standard circular saw with dust extraction. Multipor mineral insulation boards installed with additional boarding in areas that can be walked on must have a minimum thickness of 120 mm.

**Smoke extraction ducts**

It is generally possible to install Multipor mineral insulation boards around smoke extraction ducts. Due to variations in air temperature and speed, each project must be assessed individually. Our Multipor technical advisers will gladly explain the services we provide in this area.

**Scope of services**

- Project-based consultation
- Support with tendering
- On-site training for contractors
- Preparation of structural calculations to verify the performance of the structure if necessary.
4.8 Attaching loads to Multipor interior insulation systems

Different loads may be fastened directly to the Multipor / Multipor compact plus mineral insulation board or through the insulation into the load-bearing substrate, depending on the type of load. Wall plugs, anchors and screws are standard items in a builder’s toolkit. In the construction industry, specialist knowledge of the anchor substrate, fastening systems and connection method is essential for ensuring safety and reliability.

Experience suggests that the greatest challenge lies in correctly gauging the requirements and choosing the right fastener. It is also wise to seek agreement between the various trades. The following aspects should be taken into account when selecting a suitable fastener:

- What is the condition of the substrate (building material, strength class)?
- What are the dimensions of the components? Do you have to comply with specific hole depths, edge distances and spacings?
- What is the structural condition of the assembly to be mounted? What forces will be transferred?
- What stress conditions are present in the substrate (tensile or compression zone)?
- Are there any special requirements concerning corrosion protection, fire protection or temperature resistance?
- Does the fastener require approval as a structural fastening?
- Can you ensure compliance with the manufacturer’s installation requirements?

Anchor types and their operating principles

Three types of anchor fixing are suitable for fastening components to Multipor mineral insulation boards or into the load-bearing substrate:

- Steel or plastic expansion anchor
- Bonded anchor in cement or synthetic resin
- Undercut anchor with mechanical interlock.

The operating principles vary as follows:

- Friction locking: Generated by friction between the anchor and the substrate, whereby the anchorage is achieved by expansion of the segments. The expansion segments may be made from plastic or steel. A distinction is made between torque-controlled anchors (maximum load after applying a prescribed tightening...
Attaching loads to Multipor interior insulation systems


torque] and deformation-controlled anchors [expansion is achieved by driving a cone a defined length of travel into the substrate].

- Structural bonding: Bonded anchors are anchored in the substrate by bonding to the sides of the drilled hole with an adhesive, without expansion.
- Mechanical interlocking: This method requires an undercut hole or suitable cavity. The anchor is fastened so that it can support itself without generating expansion forces.

Anchor installation

Multipor offers a range of system-compatible fasteners. Please refer to the product specifications for guidance on anchor installation and be aware that each type of anchor requires a specific insertion depth and tightening torque. The product specifications and technical data sheets also provide information about requirements such as embedment depth, edge distances and spacings.

For example, it is easy to make a drill hole perpendicular to the surface with a hammer drill. Here too, information about hole depths and diameters can be found in the respective anchor manufacturers’ data sheets. The substrate determines the type of drill to use, and the settings.

- For example:
  - Ytong AAC: Three-piece drive tool [6 mm, 8 mm, 10 mm]
  - Silka calcium-silicate block: Drill with a hammering and rotary action
  - Vertically perforated bricks and lightweight materials: Drill with a rotary action
  - Other anchor substrates: Drill with a hammering and rotary action.

Clean the drilled hole with a brush or blower, because the drill dust can adversely affect the frictional behavior of friction-locking anchors and the surface penetration behavior of bonded anchors.

Fixtures

The method of load attachment depends on the anticipated load and the stress. The choice of fastening mechanism and its location depends on these factors too.

Fastening mechanism:
- Plate-fastening for non-load-bearing substrates
- Mechanical fastening of light loads to Multipor mineral insulation board
- Mechanical fastening of heavy or dynamic loads through the Multipor mineral insulation board into the substrate.

A choice of suitable fasteners can be found under ‘technical information’ on our website at www.multipor.com.

Anchoring boards to walls

Fasten the mineral insulation boards to the wall using system-compatible anchors if substrates are unsuitable for secure adhesive bonding of Multipor mineral insulation boards or if insulated interior walls are to be subsequently tiled.

Multipor screw-in anchor

Inserting Multipor screw-in anchor
**Fastening to non-load-bearing substrates, tiled surfaces etc.**
- Not possible with Multipor compact plus
- Multipor interior wall insulation with Multipor screw-in anchor [1]
- Screw length 115 for up to 60 mm interior insulation
- Screw length 135 for up to 80 mm interior insulation
- Screw length 155 for up to 100 mm interior insulation.

Bond Multipor mineral insulation boards to the wall with a full bed of mortar. Then fasten mechanically, screwing Multipor screw-in anchors through the fresh reinforcement layer [Multipor screw-in anchor, plate diameter ≥ 60 mm wet-on-wet] and the mesh into the load-bearing substrate [2].

**Fastening light loads to insulation on the inside of external walls (≤ 3 kg)**
- Multipor flat anchor: Suitable for fastening light loads of up to 3 kg to Multipor or Multipor compact plus mineral insulation board.

Light loads can be fastened directly to the Multipor flat anchor in the Multipor mineral insulation board. Hammer the flat anchor into the Multipor mineral insulation board with the open side facing inwards (the side with the tapered corners), then insert the screw provided in the center corrugation and tighten [3] [4] [5].

- Multipor spiral anchor: Suitable for fastening light loads of up to 6 kg (lengths: 50 mm, 85 mm, 120 mm) to Multipor mineral insulation board [6]. This fastening system is not suitable for Multipor compact plus.

Slit the plaster and reinforcement mesh with a Stanley knife before carefully screwing in the spiral anchor (50 mm, 85 mm, 120 mm) with a T 40 Torx bit [7] [8].
Fastening heavy loads
(≥ 6 kg)
Do not fasten loads over 6 kg and dynamic loads directly to Multipor or Multipor compact plus mineral insulation board, fasten them to the substrate instead.

- Fastening single loads: Fasten light fittings and cabling through the Multipor or Multipor compact plus mineral insulation boards into the load-bearing substrate. Point loads are distributed with the aid of a 30-mm washer [9].

- Fastening single loads: Fasten light fittings and cabling through the Multipor or Multipor compact plus mineral insulation boards into the load-bearing substrate. Point loads are distributed with the aid of a 30-mm washer [10 – 13].
Multipor ceiling insulation systems

FAST COST-EFFECTIVE NON-COMBUSTIBLE VERSATILE BASEMENT SURFACE FINISH UNDERGROUND GARAGES ECO-FRIENDLY SOLID DIMENSIONAL STABLE WOODPECKER-PROOF BASEMENT ENERGY-EFFICIENT SUSTAINABLE 100% RECYCLABLE EASY TO INSTALL EXECUTION RELIABILITY MOISTURE CONTROL FIRE PROTECTION NATURAL PURELY MINERAL-BASED BASEMENT WOODPECKER-PROOF SUSTAINABLE NON-COMBUSTIBLE EXECUTION RELIABILITY SURFACE FINISH ECO-FRIENDLY VERSATILE DIMENSIONALLY STABLE FAST GARAGES UNDERGROUND GARAGES