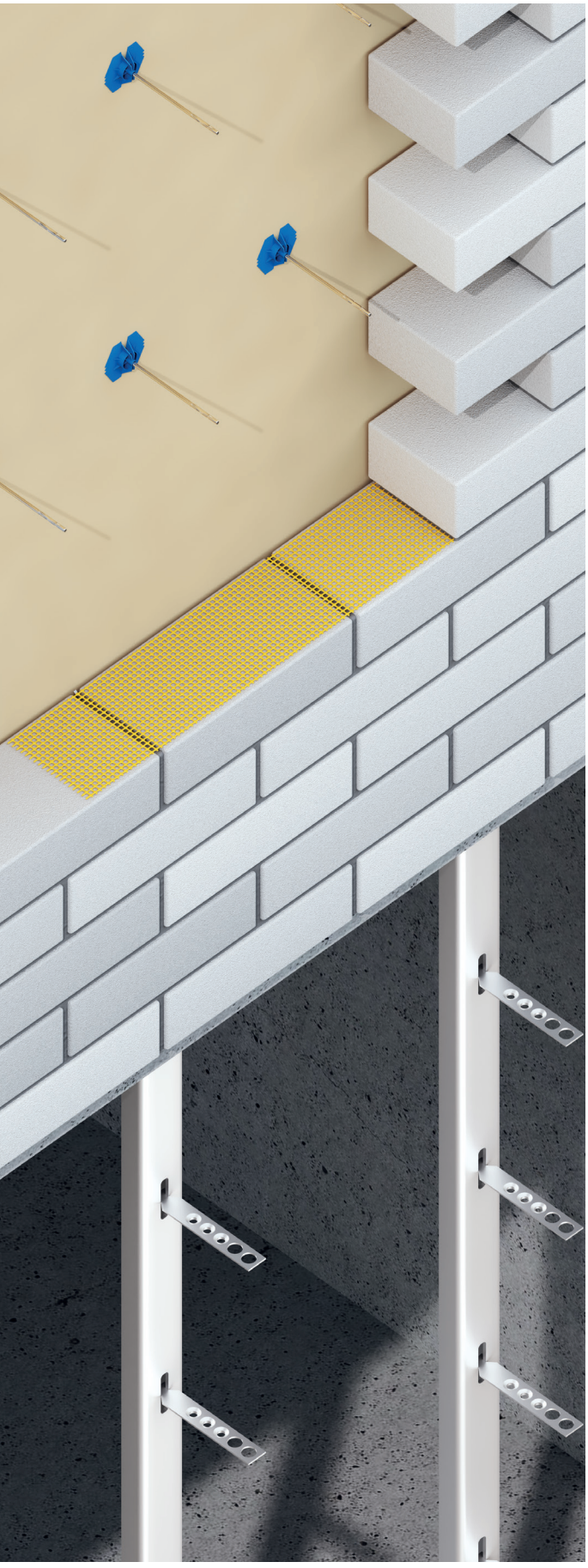
PohlCon

ISOMUR®
Wall base insulation

Technical information

Table of contents


Isomur plus
Isomur plus
Isomur plus



Application in masonry façades

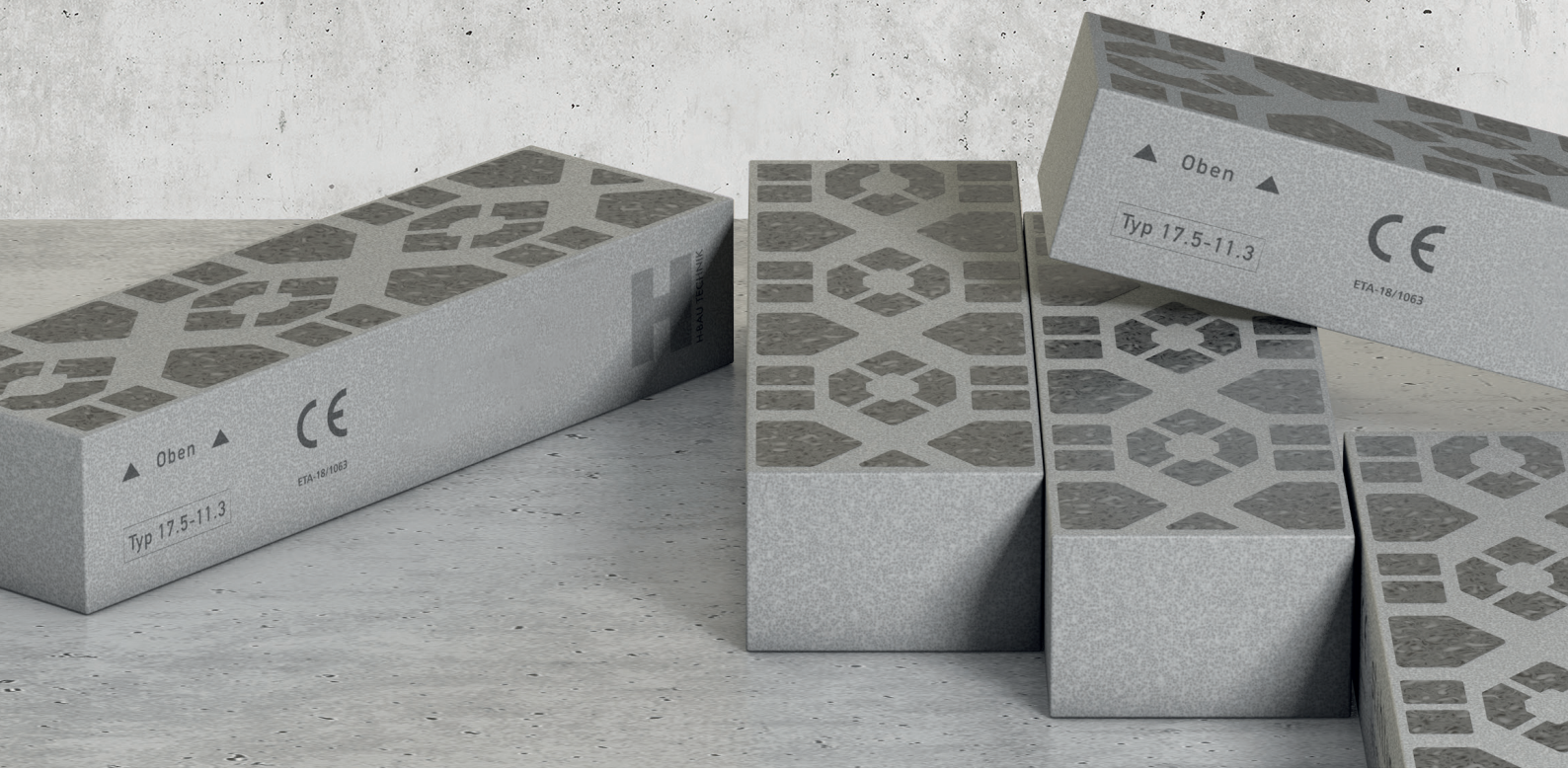
An attractive external façade is inviting and catches the eye. To attach it, you need reliable products that allow for a degree of design freedom. PohlCon specialised solutions for masonry façades not only ensure that façades are securely attached, they are also flexible, easy to work with, certified, and approved by several building authorities. With these solutions, your building is absolutely safe and secure.
To ensure that your project fulfils all your requirements, our Application Engineering team will be on hand to provide ongoing support right from the start.

ISOMUR®
Products in the ISOMUR® series provide reliable thermal insulation at the base of the building, eliminating troublesome thermal bridging in the building envelope.
Available in a choice of different strength classes, ISOMUR® wall base elements offer a high level of versatility. ISOMUR® is easy to work with on site and the non-absorbent material ensures that the thermal insulation properties are effective right from the start.

PohlCon offers additional products from the following categories:

- Fastening
- Reinforcement
- Façade fastening
- Thermal insulation

ISOMUR® wall base insulation



Product description

ISOMUR® wall base insulation is designed for use in residential buildings built using masonry construction. As a connection between the exterior wall insulation and the insulation over the foundation slab, ISOMUR® eliminatesa weak point at the base of the building. This provides continuous and effective thermal insulation throughout the entire building envelope.

The material properties of the the ISOMUR® system means that the insulating blocks do not absorb water, making them easier to work with on the construction site and ensures that their outstanding thermal insulation properties are effective from day one.

ISOMUR® is available in two types:

- ISOMUR® Plus for medium to high compression loads
- ISOMUR® Light for lower compression loads and even more cost-effective

Proof of usability

- European Technical Assessment ETA-18/1063 from 7th January 2019
- DIBt general design approval Z-17.5-1215

Advantages

- Outstanding thermal insulation properties
- Prevents thermal bridging and therefore damage caused by moisture and mould
- Improved building energy efficiency thanks to a reduction in heating costs
- Non-absorbent material guarantees effective thermal insulation properties
- Expanded product portfolio for cost-effective solutions
- High compressive strength

Applications

Products in the ISOMUR® series are installed at the base of the building to eliminate critical thermal bridging between the foundation slab and the masonry.

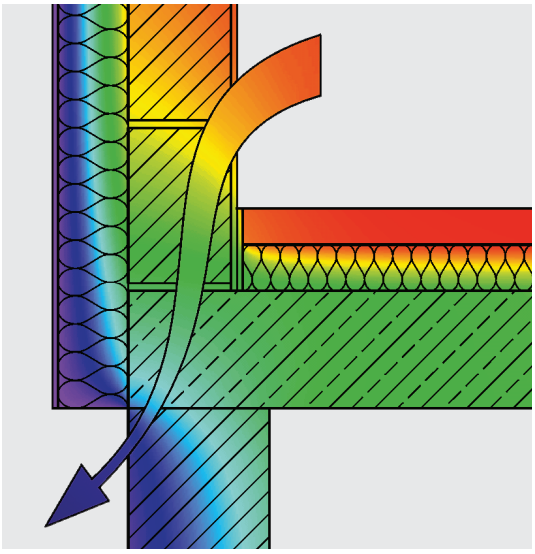
Construction physics

Thermal insulation and moisture protection

The base of the interior wall – a weak point
If the base of the interior wall is uninsulated, the masonry built on top of it may create a gap in the thermal envelope of the building between the exterior wall insulation and the thermal insulation of the foundation slab.

This means:
- An increased risk of mould due to the lower surface temperature at the base of the wall
- Loss of heat

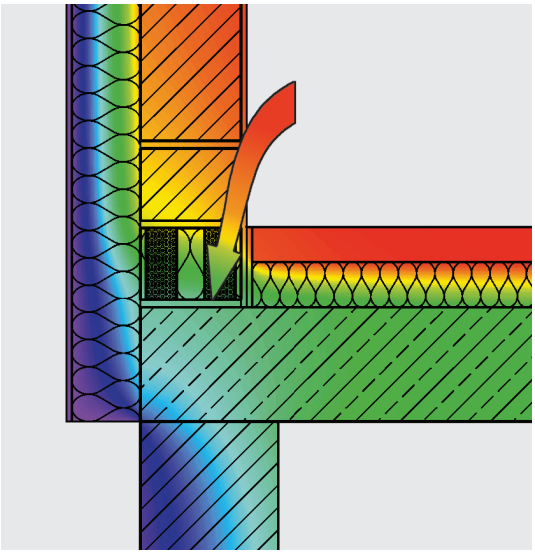
The exterior wall insulation often continues into the earth in the form of perimeter insulation in order to mitigate thermal bridging at the base of the building. The costs of this measure are not insignificant and the thermal insulation that it provides is limited. Notably, continuing to extend the perimeter insulation downwards provides no further increase in insulation effectiveness beyond a depth of approx. 0.5 m.



Uninsulated base of the building

The better the thermal insulation of the building envelope, the trickier the issue of thermal bridging becomes.
Thermal bridges are becoming increasingly problematic due to continuous improvements to the thermal insulation of building envelopes. This situation is borne out by the fact that mould growth is an issue that must be taken seriously even in new buildings, and that building developers and construction specialists are increasingly being confronted with this problem.

The risk of mould growth increases unless measures to tackle thermal bridging are introduced alongside the actual energy saving measures. This means that energy-saving measures that only concentrate on a single aspect of the problem can become a health risk.



Insulated building base with ISOMUR®

Our solution: Insulation with ISOMUR®
ISOMUR® load-bearing thermal insulation elements close the gap in the thermal insulation between the exterior wall insulation and the insulation over the foundation slab or basement roof. This provides continuous and highly effective thermal insulation.

This means:
- An increase in the surface temperature in the room to significantly above the critical dew point
- Mitigation of the risk of mould growth and condensation forming and a healthy indoor climate
- Loss of heat is minimised, providing a reduction in heating costs
- Cost savings because there is no need to install exterior wall insulation at the base

Thermal insulation effectiveness and moisture

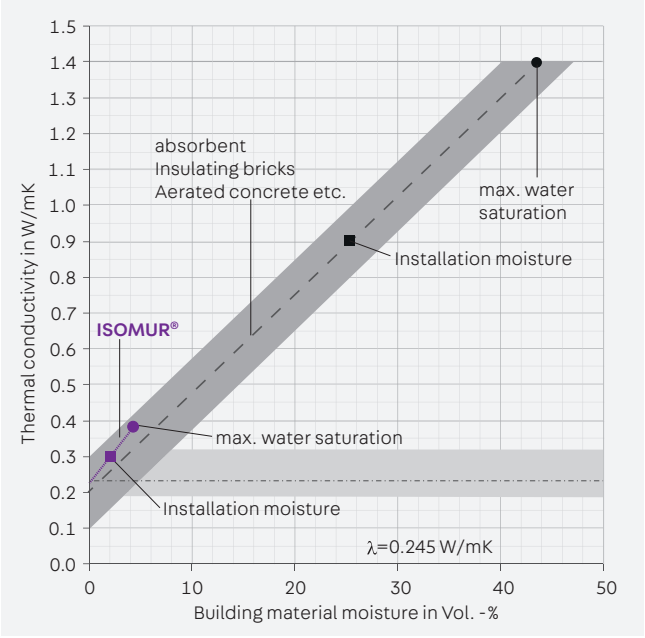
Thermal conductivity is a material parameter that is significantly affected by the moisture content of the material. The greater the absorbency of a material, the greater the negative effect of the absorbed water on its thermal insulation effectiveness. This means that the choice of material is of vital importance for applications in damp environments.

Progression of the drying out of buildings over time

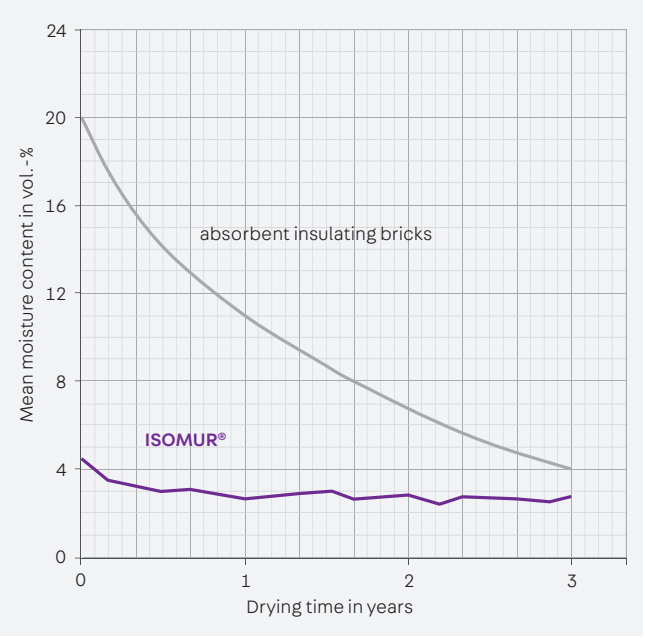
The moisture absorbed during the construction phase can only be expelled again very slowly at the base of the wall due to the "packing" of the first layer of bricks or blocks on all sides. The Fraunhofer Institute for Building Physics used FEM simulations to ascertain that the actual insulation effectiveness of damp brick or stone is significantly lower than the value required in order to prevent mould, not only during the construction phase but over the entire drying period of a new building, which lasts for several years.

Declared values and actual conditions

Absorbent building bricks and blocks have a significantly higher thermal conductivity than the values declared in data sheets when they are saturated with moisture. Thermal conductivity increases by approx. 0.28 W/mK for every 10 vol% of moisture content. Autoclaved aerated concrete, for example, can absorb water up to 45 vol%. Consequently, it has a thermal conductivity of approx. 0.9 W/mK at a construction moisture level of 25 vol%.
It should always be assumed that there will be moisture in some form at the base of a wall. Two such examples would be increased moisture content caused by standing water on the floor slab, or increased moisture as a result of applying floating screed.



Relationship between thermal conductivity and moisture in building materials using autoclaved aerated concrete and ISOMUR®* as examples



Moisture content during the drying period using absorbent insulation blocks and ISOMUR®* as examples

Our solution: Moisture-resistant components

ISOMUR® blocks absorb so little water that there is no reduction whatsoever in the effectiveness of the thermal insulation. This ensures that thermal insulation is guaranteed from the beginning without the need for laborious or costly measures during construction.

ISOMUR® plus and ISOMUR® light	λ_d W/mK
$\lambda_{eq,\ horizontal}$	**0.14**
$\lambda_{eq,\ vertical}$	**0.33**

*Source: Martinelli R., Menti K.: "Mauerfusselemente: Trockene (Mauer-) Füsse für behagliche Räume", TZ Bau + Architektur 3/2001 Untersuchungsbericht Nr. 13.17388 zur Wasseraufnahme von ISOMUR® plus-Elementen, FMPA Baden-Württemberg, Stuttgart ["Wall base elements: Dry (wall) bases for comfortable indoor spaces", TZ Bau + Architektur 3/2001 Investigation report no. 13.17388 on water absorption by ISOMUR® plus elements, Materials Testing Institute Baden-Württemberg, Stuttgart]

Fire protection

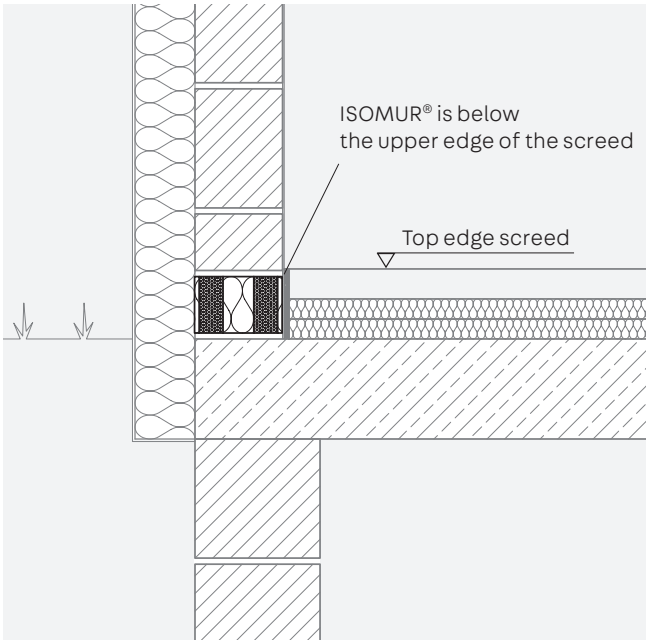
Fire safety requirements

The fire safety requirements for building walls in Germany are determined by the state building regulations (Landesbauordnungen) specific to each federal state.

Fire resistance classes F30 and F90*

Installation of ISOMUR® blocks will not cause the loss of F30 - F90 classification for space-enclosing masonry walls in accordance with DIN 4102-2:1977-09 or DIN 4102-4 providing that the following fire safety measures are implemented:

- Installation of the ISOMUR® blocks within the slab structure so that the upper edge of the block is ≤ the upper edge of the screed (fire behaviour class A), or
- ISOMUR® blocks are plastered on both sides with a minimum plaster thickness of 15 mm in accordance with DIN 4102-4, section 4.5.2.10



Alternatively, the plaster on the outside of exterior walls can be replaced with mineral wool with a melting point of ≥ 1000 °C as thermal insulation or with facing masonry.

Installation of the thermal insulation elements does not cause the loss of F30 - F90 classification for non-enclosing masonry walls in accordance with DIN 4102-2:1977-09 or DIN 4102-4. Additional fire safety measures are not necessary.

The designation of the walls when installing ISOMUR® blocks is as follows: **F30-AB, F60-AB or F90-AB in accordance with DIN 4102-2**

The fire resistance class for load-bearing columns and load-bearing, non-enclosing wall sections (length < 1 m) has not been established.

Firewalls*

The use of ISOMUR® in firewalls in accordance with DIN 4102-3:1977-09 is not permitted.

Sound insulation

Installing ISOMUR® blocks does not compromise the sound insulation characteristics of the wall.

Earthquakes

ISOMUR® elements may be installed in earthquake zones 1-3 in accordance with DIN EN 1998-1, Eurocode 8.
For shearing stress caused by earthquakes, only walls with ISOMUR® plus should be considered.

*Source: Deutsches Institut für Bautechnik DIBt [German Institute of Structural Engineering] | European Technical Assessment ETA-18/1063 from 7th January 2019 | Section 3.11.3

Technical data

Dimensions and weights

Type width/height	Length mm	Width mm	Height mm	Weight of ISOMUR® plus g	Weight of ISOMUR® light g
11.5–11.3	600	115	113	7500	7000
15.0–11.3	600	150	113	9500	8850
17.5–11.3	600	175	113	11,000	10,200
20.0–11.3	600	200	113	13,000	12,100
24.0–11.3	600	240	113	15,500	14,400
30.0–11.3	600	300	113	19,000	17,700

For permissible tolerances, see ETA-18/1063 section 3.3

Structural design

Characteristic compressive strength

The load-bearing capacity of a wall with integrated ISOMUR® Plus or ISOMUR® Light wall base blocks is listed in Table 4 as the value f_k in accordance with EN 1996:2013-02, Eurocode 6: Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures.

ISOMUR® plus structural analysis

	Sand-lime brick masonry (proportion of holes ≤ 15%)			Vertically perforated brick (proportion of holes ≤ 50%)		
Brick strength N/mm²	**Mortar 5 N/mm² (MG IIa)**	**Mortar 10 N/mm² (MG III) 15 N/mm²**	**Thin bed mortar**	**Mortar 5 N/mm² (MG IIa)**	**Mortar 10 N/mm² (MG III) 15 N/mm²**	**Thin bed mortar**
4	-	-	-	(1.3)	2.4 (-)	-
6	-	-	-	(1.8)	3.1 (2.1)	3.1
8	-	-	-	(2.2)	3.7 (2.5)	3.7
10	-	-	-	(2.6)	4.2 (2.9)	4.2
12	(4.0)	4.3	4.5	(2.9)	5.0 (2.9)	4.6
16	(4.7)	5.2	5.7	(2.9)	5.9 (2.9)	5.4
≥ 20	(5.3)	5.9	6.8	(2.9)	6.1 (2.9)	5.6

Values as per ETA-18/1063. Values that deviate from the general design approval for Germany are shown in brackets.

ISOMUR® light structural analysis

	Sand-lime brick masonry (proportion of holes ≤ 15%)			Vertically perforated brick (proportion of holes ≤ 50%)		
Brick strength N/mm²	**Mortar 5 N/mm² (MG IIa)**	**Mortar 10 N/mm² (MG III) 15 N/mm²**	**Thin bed mortar**	**Mortar 5 N/mm² (MG IIa)**	**Mortar 10 N/mm² (MG III) 15 N/mm²**	**Thin bed mortar**
4	-	-	-	(1.3)	2.4 (-)	-
6	-	-	-	(1.8)	2.9 (2.1)	2.9
8	-	-	-	(2.2)	2.9 (2.5)	2.9
10	(2.8)	2.9	3.1	(2.6)	2.9	2.9
≥ 12	(2.9)	2.9	3.1	(2.9)	2.9	2.9

Values as per ETA-18/1063. Values that deviate from the general design approval for Germany are shown in brackets.

Characteristic value f_{vk} for shear strength

The shear strength of a wall with integrated ISOMUR® Plus wall base blocks is listed as the value f_{vk} in accordance with EN 1996:2013-02, Eurocode 6: Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures.

f_{vk} values for masonry walls with integrated ISOMUR® Plus wall base

Brick strength N/mm²	**Sand-lime brick masonry 1) with standard mortar** N/mm²	**Sand-lime brick masonry 1) with thin bed mortar** N/mm²	**Clay brick masonry 2) with standard mortar** N/mm²	**Clay brick masonry 2) with thin bed mortar** N/mm²
12	0.7 (0.2)	0.7 (0.2)	0.7 (0.2)	0.7 (0.2)
16	0.9 (0.2)	0.9 (0.2)	0.9 (0.2)	0.9 (0.2)
≥ 20	0.9 (0.2)	0.9 (0.2)	0.9 (0.2)	0.9 (0.2)

1) Sand-lime brick masonry with an unperforated proportion of ≥ 85 % (proportion of holes ≤ 15%) in accordance with EN 771-1, clay brick masonry with an unperforated proportion of ≥ 50% (proportion of holes ≤ 50%) in accordance with EN 771-1
2) M10 or M15 standard mortar, or thin bed mortar, in accordance with EN 998-2
The values listed in Table 4 are based on the following assumptions: Effective wall height hef = height between floors (no reduction due to restraint)

Values as per ETA-18/1063. Values that deviate from the general design approval for Germany are shown in brackets.

No values have been declared for the shear strength of ISOMUR® light elements.

Normal force that can be absorbed by masonry with ISOMUR® plus/light

Wall thickness t cm	Clear wall height m	Intermediate support	End support – floor slab, fully supported slab a / t = 1.0				End support – roof a / t = 1.0
			L = 4.5 m	L = 5.0 m	L = 5.5 m	L = 6.0 m	L ≤ 6.0 m
11.5	2.5	21.5	21.5	21.5	21.5	21.5	21.5
15.0	2.5	46.3	46.3	46.3	46.3	46.3	28.3
17.5	2.5	62.0	62.0	62.0	62.0	59.5	33.0
20.0	2.5	76.9	76.9	76.9	76.9	68.0	37.7
24.0	2.5	99.4	99.4	99.4	92.9	81.6	45.3
30.0	2.5	131.5	131.5	130.3	116.2	102.0	56.6
11.5	2.75	14.4	14.4	14.4	14.4	14.4	14.4
15.0	2.75	40.8	40.8	40.8	40.8	40.8	28.3
17.5	2.75	57.4	57.4	57.4	57.4	57.4	33.0
20.0	2.75	72.8	72.8	72.8	72.8	68.0	37.7
24.0	2.75	96.0	96.0	96.0	92.9	81.6	45.3
30.0	2.75	128.8	128.8	128.8	116.2	102.0	56.6
24.0	3.0	92.2	92.2	92.2	92.2	81.6	45.3
30.0	3.0	125.8	125.8	125.8	116.2	102.0	56.6

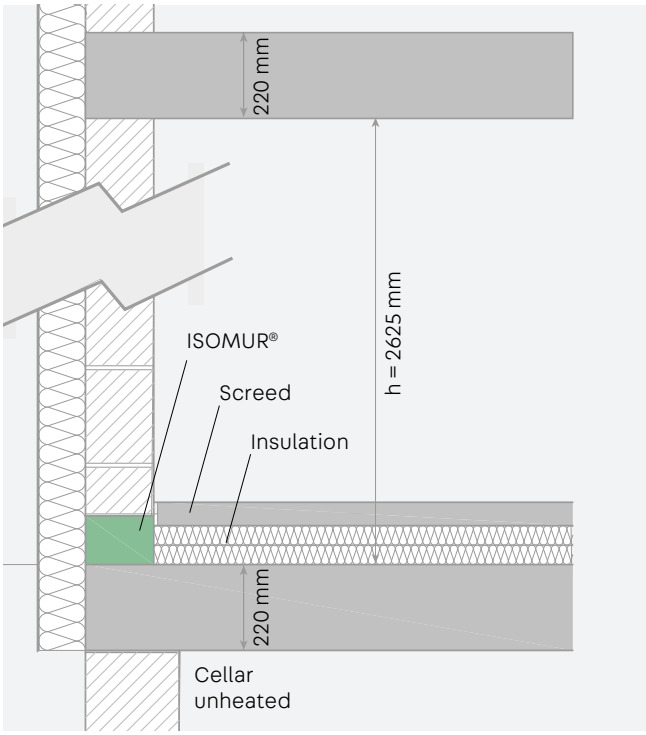
L: floor span | a: support depth | t: wall thickness

Prerequisites for use:
- Compliance with the conditions of use of the simplified calculation method in accordance with DIN EN 1996-3NA
- Effective height is height between floors, h_{ef} = h – see ETA-18/1063
- n_{Rd} = table value · f_k

Notes on structural design:

- Effective wall height h_{ef} = height between floors (no reduction due to restraint)
- ISOMUR® insulated blocks must only be installed in the very bottom or very top masonry layer. The masonry/the floor slab must be supported across its entire area (brick width ≤ element width)
- For masonry that is subject to loading perpendicular to its plane, bending tensile stresses must not be taken into consideration. If calculations are required as proof of the absorption of this loading, load-bearing action only vertically with respect to the bed joints must be assumed, excluding bending tensile stresses.
- If proof of shearing force is provided in accordance with DIN EN 1996-1-1, section 6.2, in conjunction with DIN EN 1996-1-1/NA, NCI under 6.2, at most for masonry with ISOMUR® plus elements the value f_{vk} or f_{vlt} = 0.2 MN/m² may be taken into consideration, and for masonry with ISOMUR® light elements the value f_{vk} or f_{vlt} = 0.08 MN/m² may be taken into consideration.

Structural design example



Boundary conditions

- External wall with additional insulation
- Simplified calculation method in accordance with DIN EN 1996-3/NA

Selected
- Sand-lime bricks – precision blocks
- Compression strength class 20/thin bed mortar
- ISOMUR® plus wall base thermal insulation element

- f_k = 10.50 N/mm² sand-lime brick – precision block
- f_k = 6.80 N/mm² ISOMUR® plus
  (see p. 14, ISOMUR® plus structural analysis)

- Span: l = 5.50 m < 6.00 m
- Wall thickness: t = 0.175 m
- Clear height between floors: h = 2.625 m ≤ 2.75 m
- Support depth: a = 0.175 m
  a / t = 1.0 ≥ 100 mm
- Live load on floor: < 5 kN/m²
- Building height above ground level: ≤ 20.00 m

The boundary conditions for using the simplified calculation methods have been fulfilled.

Structural design by calculation

N_{Gk} = 75.0 kN/m; N_{Qk} = 25.0 kN/m

$N_{Ed} = 1.35 * \Sigma N_{Gk} + 1.50 * \Sigma N_{Qk}$
$= 1.35 * 75.0 + 1.50 * 25.0 = 138.8$ kN/m

h_{ef} = h (see ETA)
= 2.625 m

$\Phi_1 = 1.6 - l / 6 = 0.68 \leq 0.90 * a / t$
$= 1.6 - 5.50 / 6 = 0.68 < 0.90 = 0.9 * 1.0$
= 0.683

$\Phi_2 = 0.85 * a / t - 0.0011 * (hef / t)^2$
$= 0.85 * 1.0 - 0.0011 * (2.625 / 0.175)^2$
= 0.603

$\Phi = \min(\Phi_1; \Phi_2) = \Phi_1 = 0.603$

$f_d = \zeta * f_k / \Upsilon_M$
$= 0.85 * 6.8 / 1.5 = 3.85$ N/mm²

$N_{Rd} = A * f_d * \Phi$
$= 1.0 * 0.175 * 3.85 * 0.603$
= 0.406 MN/m = 406.00 kN/m

Proof:
N_{Ed} = 138.8 kN/m < 406.00 kN/m

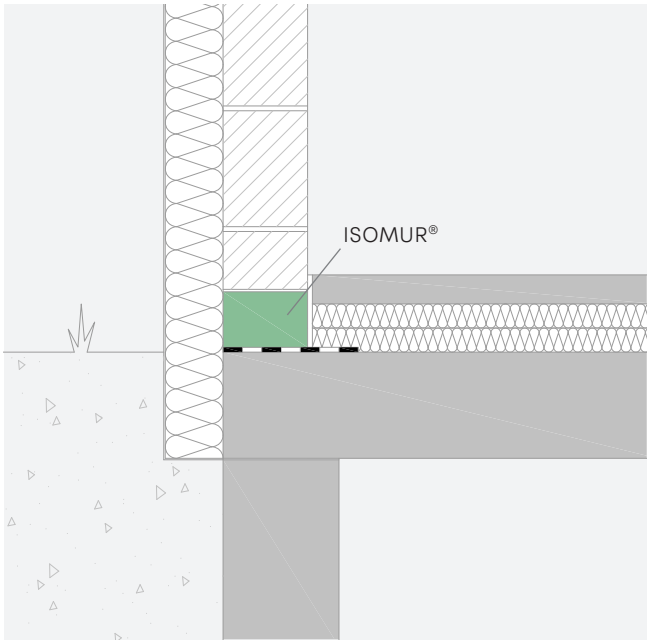
Structural design by reading the values in the table (p. 16)

Read wall height 2.50 m, table value = 62.00
Read wall height 2.75 m, table value = 57.40
Interpolation for wall height 2.625 m, value = 59.70

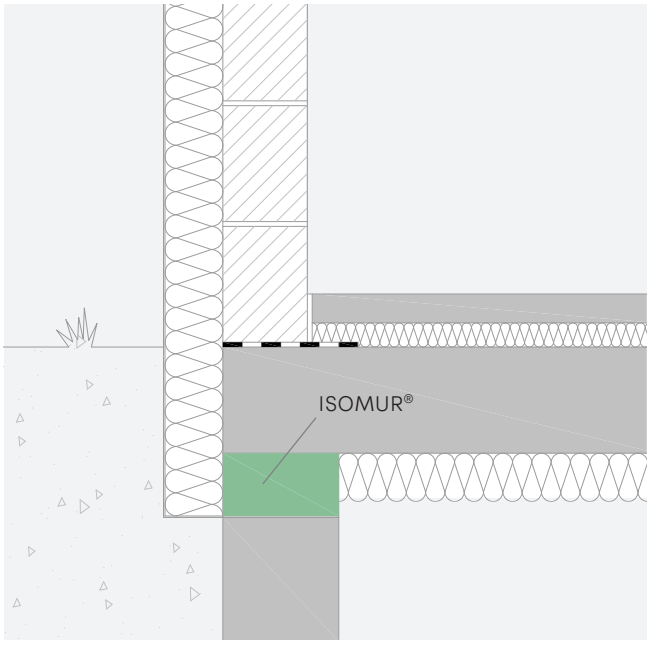
N_{Rd} = 59.70 x 6.8 = 406.00 kN/m

Installation situations

External thermal insulation composite system

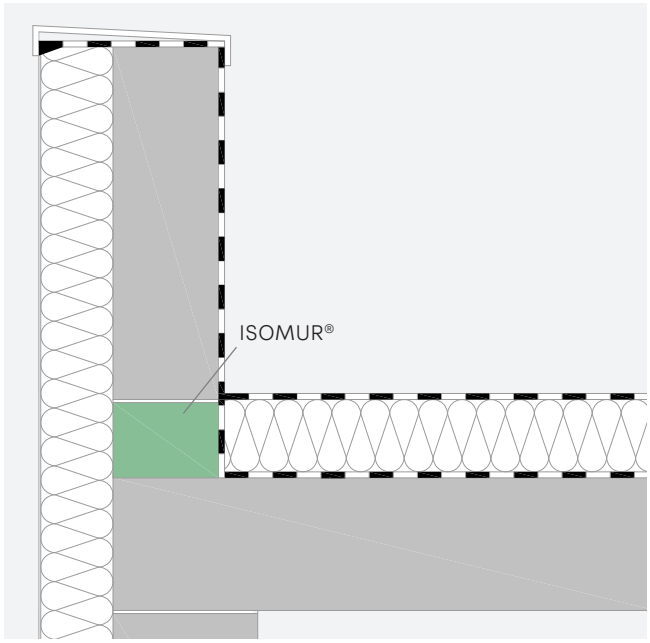


ISOMUR® in the wall above the basement ceiling or foundation slab



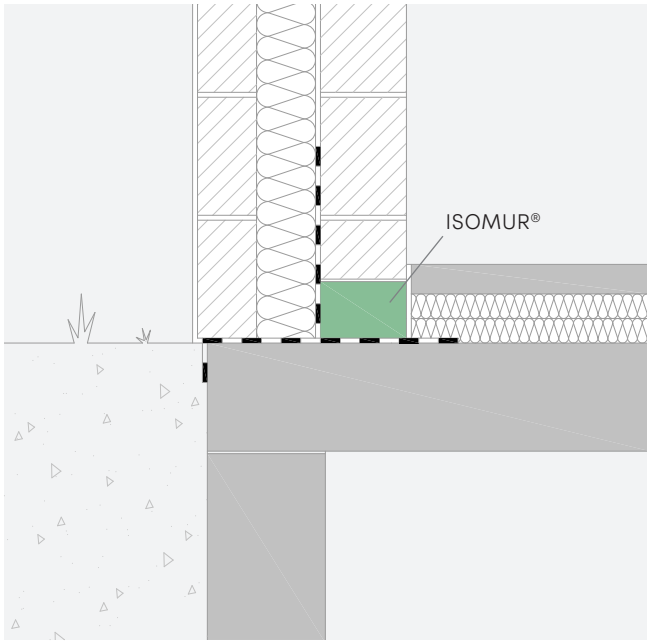
ISOMUR® in the wall below the basement ceiling

Parapet

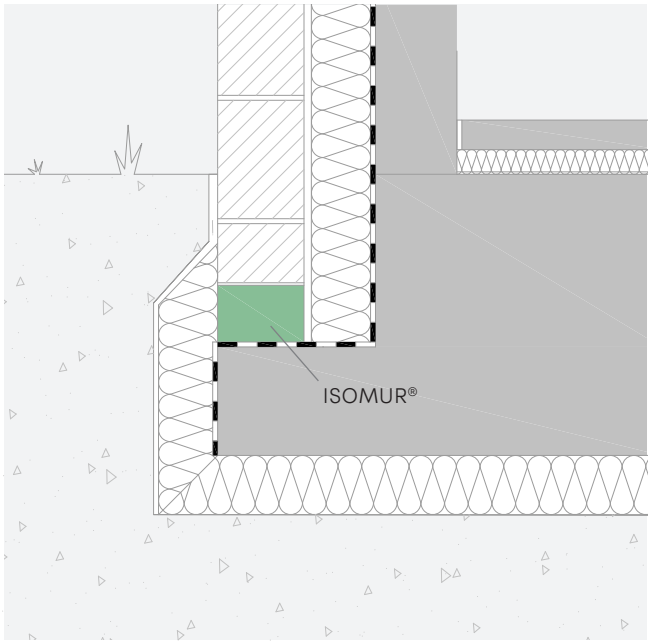


ISOMUR® in the base of the parapet

Curtain wall facing masonry



ISOMUR® in the wall above the basement ceiling



ISOMUR® in non load-bearing exterior wall

Installation instructions for ISOMUR® plus/light

General information

- The masonry/the floor slab must be supported across its entire area
  (brick width ≤ element width).
- The thin bed mortar for the precision block walls must be applied so as to ensure that a joint with a thickness of at least 1 mm and at most 3 mm is formed on the polystyrene areas of the ISOMUR® blocks and any negative tolerances in the load-bearing structure are compensated for.
- ISOMUR® insulated blocks may be trimmed to adapted lengths using abrasive cut-off wheels. All shortened sections must be at least 200 mm long.
- Adapted lengths of ISOMUR® must not be lined up next to one another.
- The cross section of the ISOMUR® load-bearing structure must not be weakened by grooves, slots or cut-outs.
- Coatings containing solvents must not be applied to the ISOMUR® insulated blocks.
- The ISOMUR® insulated blocks must be protected from high temperatures and flames (e.g. when bitumen sheeting is being heat bonded).
- There is an indication on the ISOMUR® insulated blocks to show which side is the top.
- With regard to waterproofing measures, comply with the requirements set out in DIN 18195, part 4.

Installation above the basement ceiling

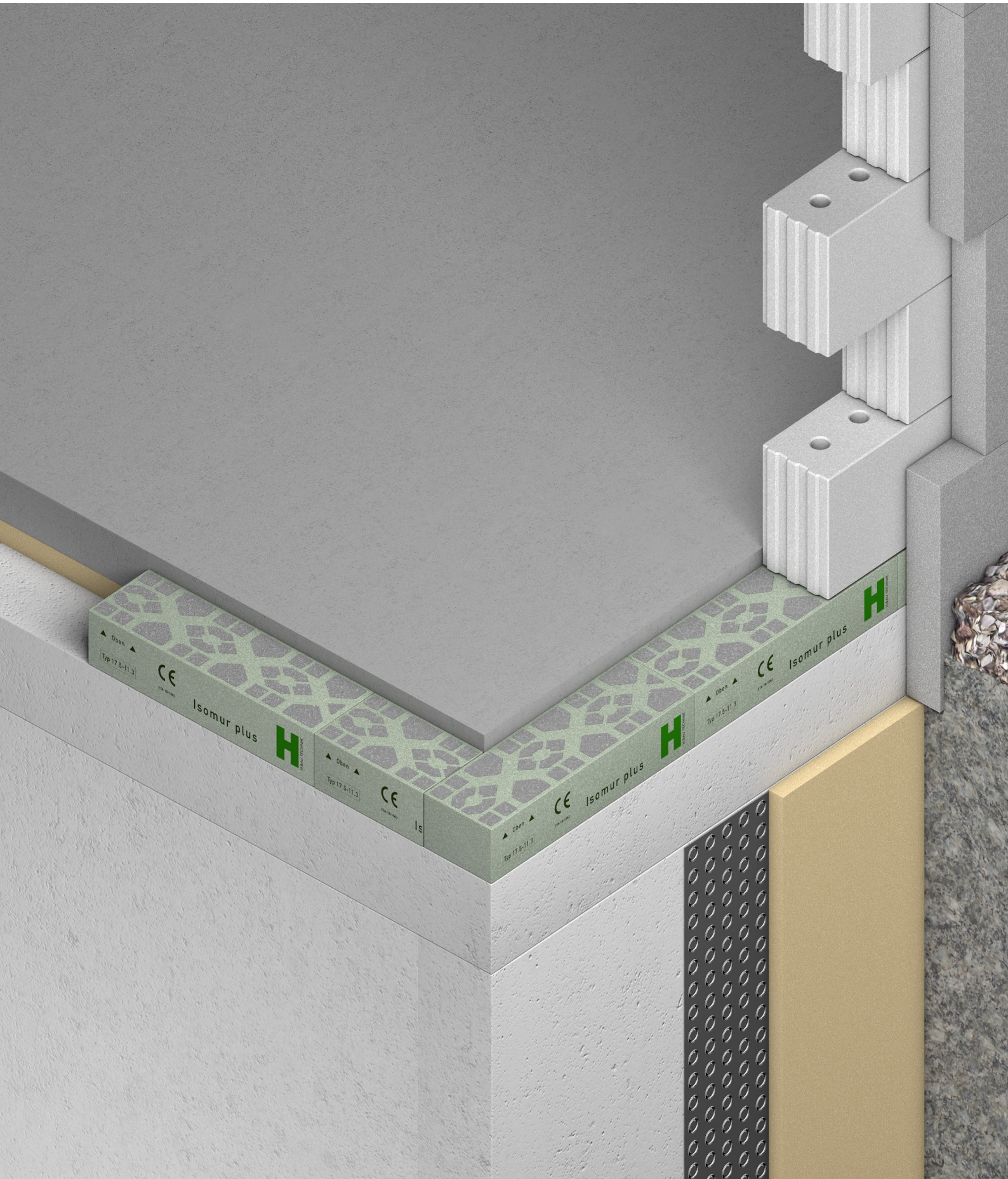
- The ISOMUR® insulated blocks must be arranged on a mortar bed made from standard mortar (as per DIN EN 998-2) or a mortar from mortar group IIa/III (in conjunction with DIN V 18580/DIN V 20000-412) such that they are in contact with one another without a joint and are offset from one another. Once the ISOMUR® insulated blocks are in place, wait until the mortar has set sufficiently to ensure that there is no risk to their stability before proceeding with further work.
- The ISOMUR® insulated blocks must be carefully positioned, taking particular care to ensure that a flat, horizontal surface is provided for laying precision blocks.

Installation below the basement ceiling

- The ISOMUR® insulated blocks must be arranged on a mortar bed made from standard mortar (as per DIN EN 998-2) or a mortar from mortar group IIa/III (in conjunction with DIN V 18580/DIN V 20000-412) such that they are in contact with one another without a joint and are offset from one another. Once the elements are in place, wait until the mortar has set sufficiently to ensure that there is no risk to their stability before proceeding with further work.
- The ISOMUR® insulated blocks must be carefully positioned, taking particular care to ensure that a flat, horizontal surface is provided for laying precision blocks.

Installation with non-load-bearing exterior walls (masonry façades)

- Install the ISOMUR® insulated blocks below ground level.
- The exterior wall may protrude by no more than 10 mm.
- With regard to sealing measures, comply with the requirements set out in DIN 18195.


Isomur plus
Isomur plus
Isomur plus

Our synergy concept for your benefit

With us, you benefit from the collective experience of three established manufacturers, who combine products and expertise in a comprehensive range. That is the PohlCon synergy concept.

Full-service consulting

Our extensive network of consultants is available to answer all your questions about our products on site. From planning to use, you can enjoy personal support from our qualified employees.

Digital solutions

Our digital solutions provide targeted support in planning with our products. From tender texts to CAD details and BIM data, right through to modern software solutions, we offer customized support for your planning process.

7 fields of application

We think in terms of holistic solutions. This is why we have combined our products into seven fields of application, where you can benefit from their synergy and the overall PohlCon product portfolio.

10 product categories

In order to find the right product in our extensive range even faster, we have divided our products into ten product categories. This way you can navigate unerringly between our products.

Individual solutions

No series product on the market is suitable for your project? We realize unique construction projects and exceptional challenges with the many years of expertise of the three manufacturing brands.

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