

MORE REASONS TO FEEL GOOD.

LIGHT LOAD-BEARING MATERIAL WITH
THERMAL INSULATION PROPERTIES.



Made from recycled glass and extremely high quality. **STRONG. WARM. DURABLE.**

Is there an insulation material, which is lightweight, instantly load bearing, moisture resistant, totally thermal insulating and rot proof? Suitable for almost any type of terrain and easy to process? A building material that is both economically and environmentally sound?



The answer is yes! **GEOMATERIALS Foam Glass** is a high quality insulation material made of 100% recovered glass, meeting all requirements of a lightweight aggregate with the best characteristics.

GEOMATERIALS Foam Glass takes over the draining function, is load bearing and functions simultaneously as a thermal insulation for covered construction components. This is a brilliant solution for a thermal bridge-free floor construction in one easy step.

THE 7 MAIN ADVANTAGES

➔ **High Thermal Insulation**

➔ **Load Bearing**

the load-capacity can be controlled by the compression ratio

➔ **Non-Capillary**

prevents moisture from rising and percolates water

➔ **Permanently Stable**

resistant against aging, rotting, fire, bacteria, frost, acids, bases, moisture and rodents

➔ **Environmentally friendly**

made from 100% recycled glass, energy efficient in manufacturing, harm- less to soil, inert and pH neutral

➔ **Saving Time and Money**

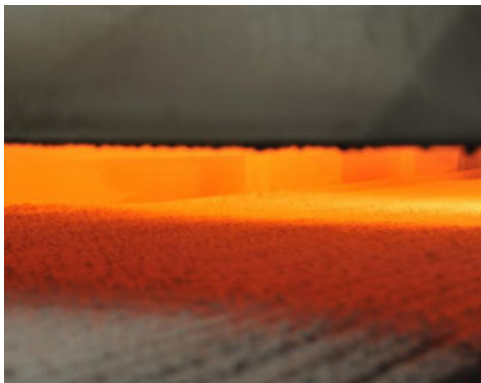
due to efficiency and speed of installation

➔ **Sustainable**

no consumption of raw materials as it is made from recycled material



Production of GEOMATERIALS Foam Glass **USED GLASS AS A RAW MATERIAL**



At approx. 900°, glass powder is expanded to foam glass.

Upon cooling, the foam glass cake breaks through tension cracks into foam glass gravel.

Recycled glass is crushed into extremely fine powder and blended with foaming agents. This process reuses valuable raw materials and saves energy initially required for the production of glass. Due to this, the energy used in producing **GEOMATERIALS Foam Glass** is significantly reduced.

THE MANUFACTURING PROCESS

GEOMATERIALS Foam Glass is sintered at high temperatures. Foam glass occurs out of glass powder during an expansion process in the latest conveyor ovens at a temperature of approximately 900°C. The foam glass cake comes out of the kiln on the conveyor belt to cool down. During this cooling process, tension cracks occur and so it breaks down into our foam glass gravel. This activity results in the **GEOMATERIALS Foam Glass** having a closed cell structure, which is evenly distributed.

The finished **GEOMATERIALS Foam Glass** stands for sustainability through recycling. This makes it particularly environmentally friendly.

APPLICATION
NEW BUILDING

Structural
engineering load
bearing insulation
beneath the ground
slab

A HIGH QUALITY RECYCLED GLASS PRODUCT

without strip footing (no basement)
DIN EN ISO 13793



Picture: Klikovits in Siegendorf/Burgenland //
© Wolfgang Paschinger, PASCHINGER ARCHITEKTEN ZT, Vienna



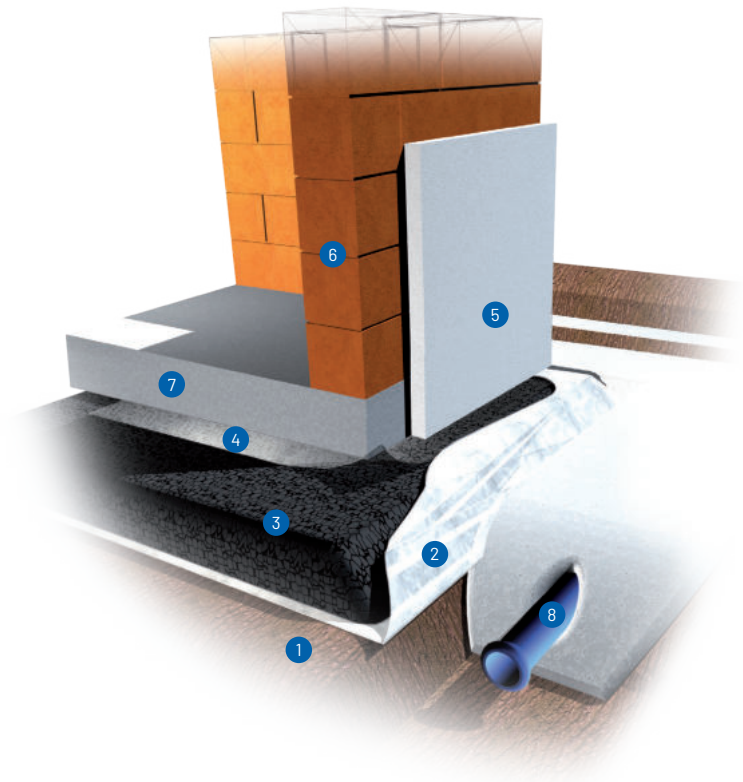
GEOMATERIALS Foam Glass is revolutionizing the conventional floor structure and replaces gravel, sub base and extruding rigid foam panels. Due to a circumferential insulation of the foundation-/cellar plate, a closed umbrella-shaped insulation results. Therefore, the conventional and time-consuming strip foundation can be omitted. **GEOMATERIALS Foam Glass** forms a homogeneous exterior insulation without thermal bridges.

STATIC CALCULATIONS

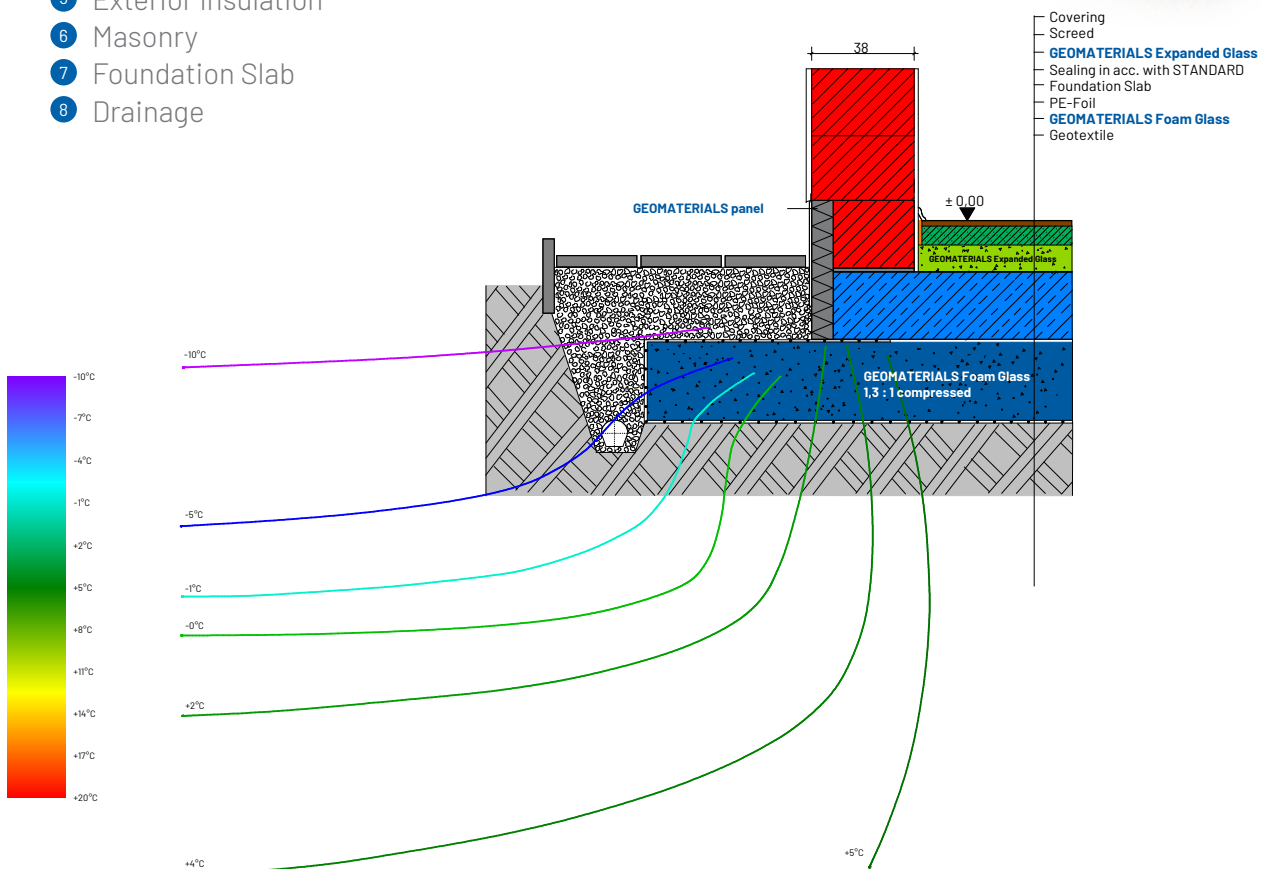
Support structure planning and construction physics-static constructive processing.
Please look at our references (QR Code) to get details to this project as well as detailed static calculations of the floor slab with **GEOMATERIALS Foam Glass**.

ADVANTAGES

- Suitable for the thermal insulation beneath the ground slab of single-family houses, production halls, schools and industrial building
- **Higher compressive strength** than other materials at a more simple and cost-effective installation technology
- Operations, such as grading excavation, installation of gravel-, grit- and fine sand ground up to lean concrete layer can be eliminated
- **Strip-foundation can be eliminated.**



- 1 Sub-grade
- 2 Geotextile as required
- 3 **GEOMATERIALS Foam Glass**
- 4 PE-Foil
- 5 Exterior Insulation
- 6 Masonry
- 7 Foundation Slab
- 8 Drainage



APPLICATION
NEW BUILDING

Structural
engineering load
bearing insulation
beneath the floor slab

A HIGH QUALITY RECYCLED GLASS PRODUCT

with strip footing (no basement)



Picture: Ingo Novak, GEOMATERIALS



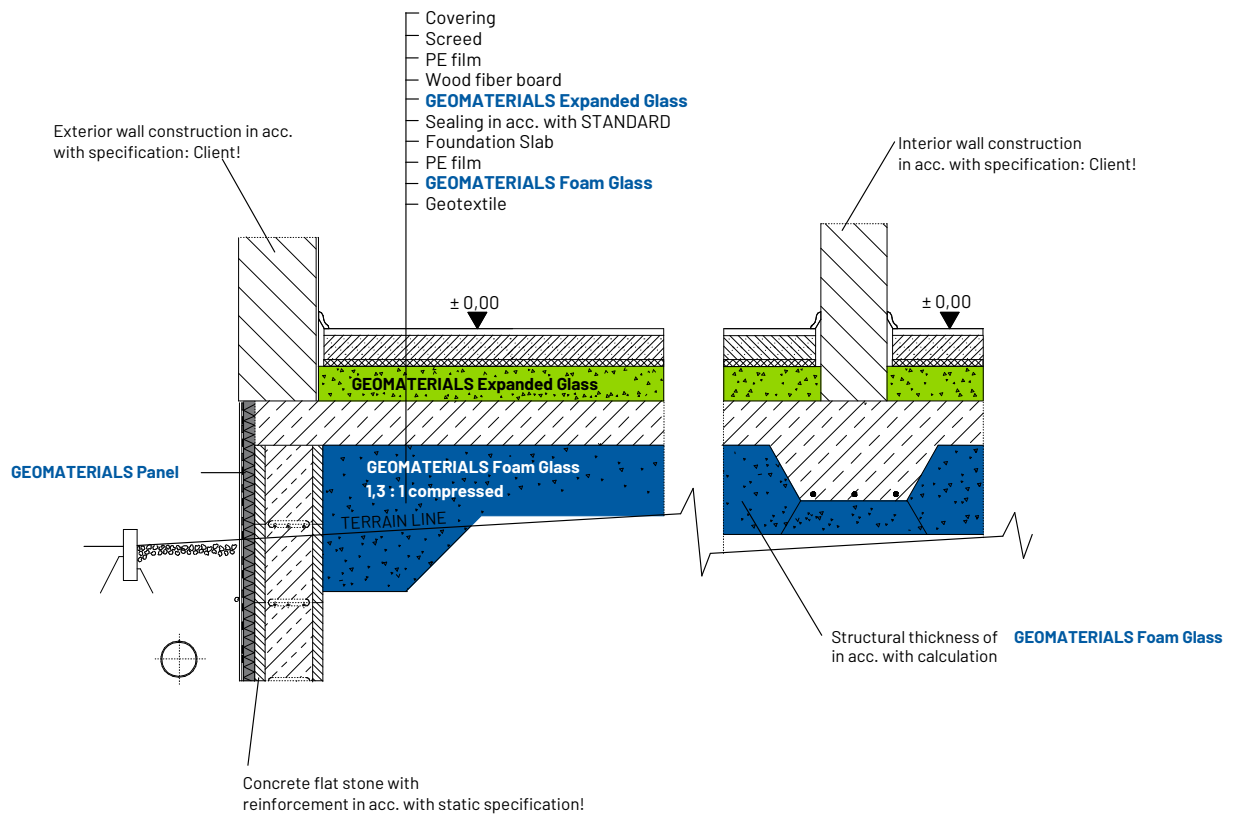
Ground slabs with **GEOMATERIALS Foam Glass** are typically executed without strip footing. Should the constructional requirements need a strip footing (slope, rising level), **GEOMATERIALS Foam Glass** presents the perfect thermal insulation between foundations. As a bulk material, **GEOMATERIALS Foam Glass** is significantly easier and quicker to install compared to insulating boards. No cutting, just dumping, distributing and vibrating.

ADVANTAGES

- Simple and quick to install
- Suitable for the thermal insulation beneath the ground slab of single-family houses, production halls, schools and industrial building
- Operations, such as grading excavation, installation of gravel-, grit- and fine sand ground up to lean concrete layer can be eliminated
- Draining and thermal insulation in one step



- 1 Sub-grade
- 2 Geotextile if required
- 3 **GEOMATERIALS Foam Glass**
- 4 PE-Foil
- 5 Foundation Slab
- 6 Strip Footing



Floor construction without ground slab

Floor renovation with **GEOMATERIALS Foam Glass** without a screed

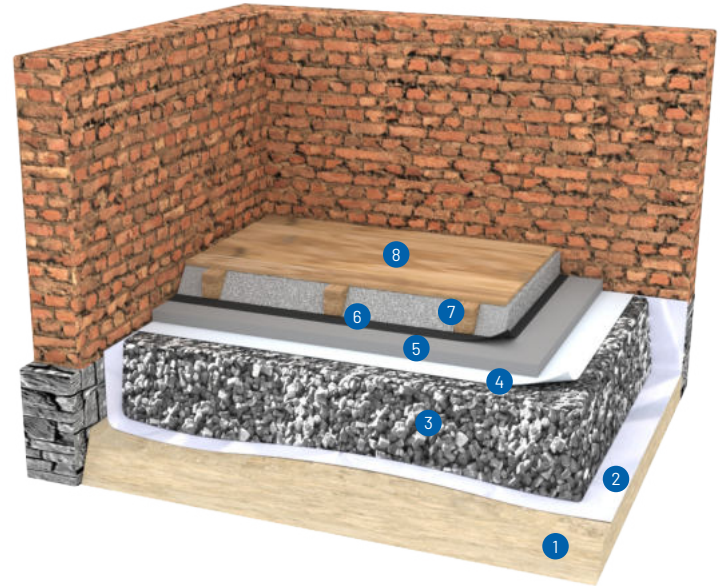


The floor construction with **GEOMATERIALS Foam Glass** is suitable for new constructions and renovations.

Especially in the application of renovation of floor systems of old buildings where the construction height is limited. **GEOMATERIALS Foam Glass** combines a draining layer and thermal insulation in one product and thus reduces the construction height. Furthermore, you can do without ground slabs, if you make the floor structure with **GEOMATERIALS Foam Glass**. With diffusible structures, additional sealing and subbase is not necessary - this is an enormous saving of work time and effort (under consideration of DIN/ÖNORM)!

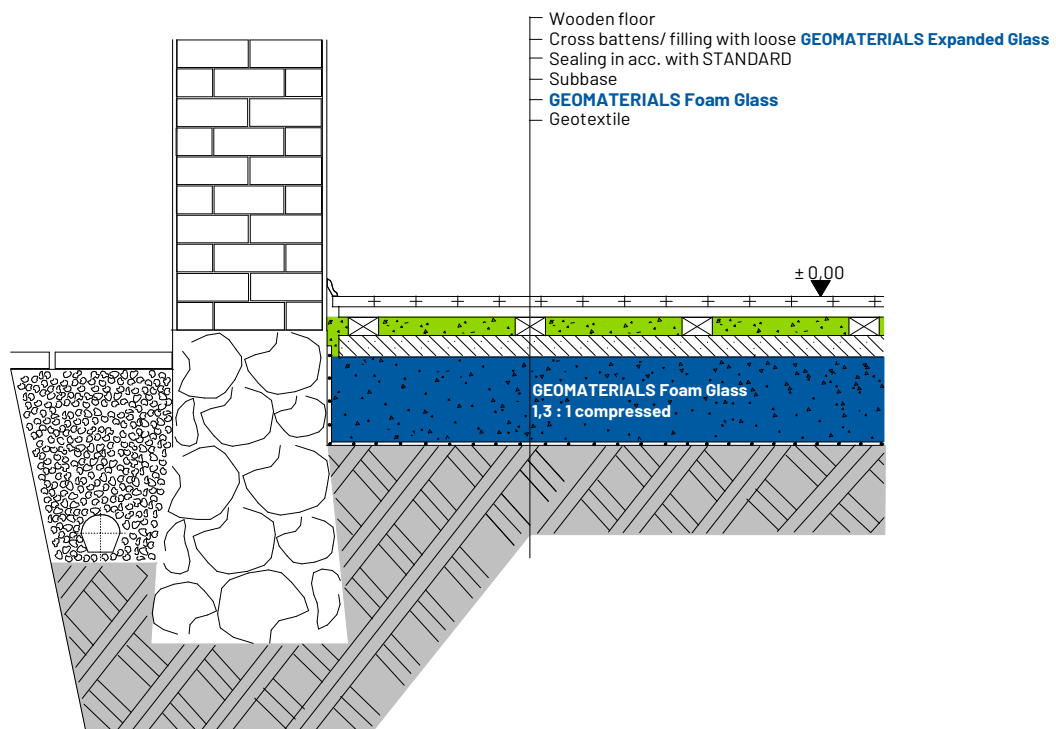
ADVANTAGES

- Suitable for **new constructions** and **renovation of old buildings**
- No requirement of foundation slabs, gravel and subbases
- Significant lower construction height with **GEOMATERIALS Foam Glass**
- **Environmentally harmless** and thus perfectly suited for living areas



- 1 Sub-grade
- 2 Geotextile if necessary
- 3 **GEOMATERIALS Foam Glass**
- 4 PE-Foil
- 5 Granular Subbase* / **GEOMATERIALS Expanded Glass***
- 6 Compaction according to DIN / ÖNORM*
- 7 Wooden Joists
- 8 Floor

*can be eliminated



Floor construction without ground slab

Floor renovation with **GEOMATERIALS Foam Glass** with a reinforced screed

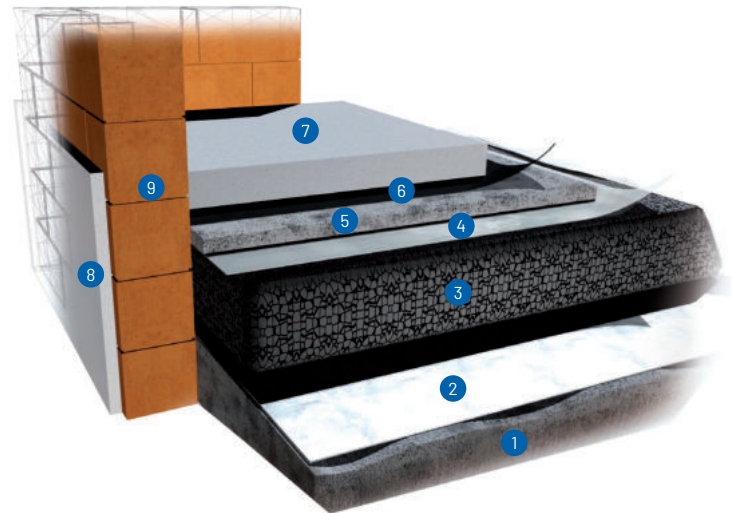


Picture: Renovation Funnixer Grashaus in Wittmund-Funnix/Germany
© Architect's Office DI Ralph Thater, Wittmund-Funnix

With **GEOMATERIALS Foam Glass**, a significantly lower construction height can be realized. Due to the systematical construction with, i.e. 30 cm compacted **GEOMATERIALS Foam Glass**, you can achieve a perfect floor construction in combination with the subsequent screed layer.

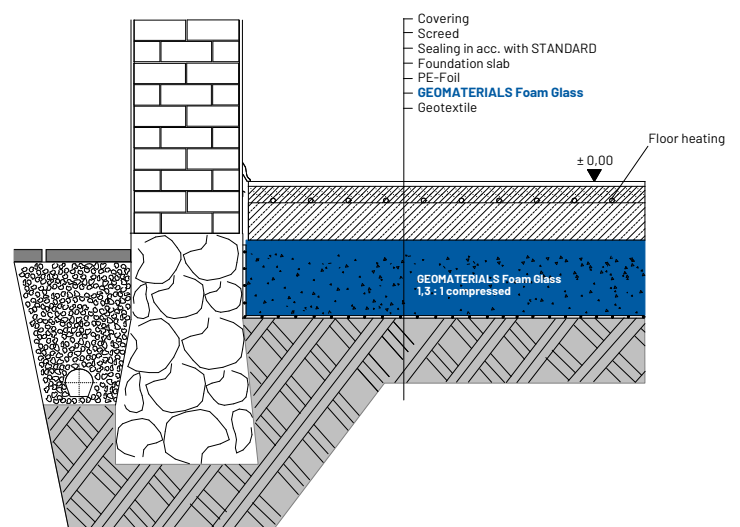
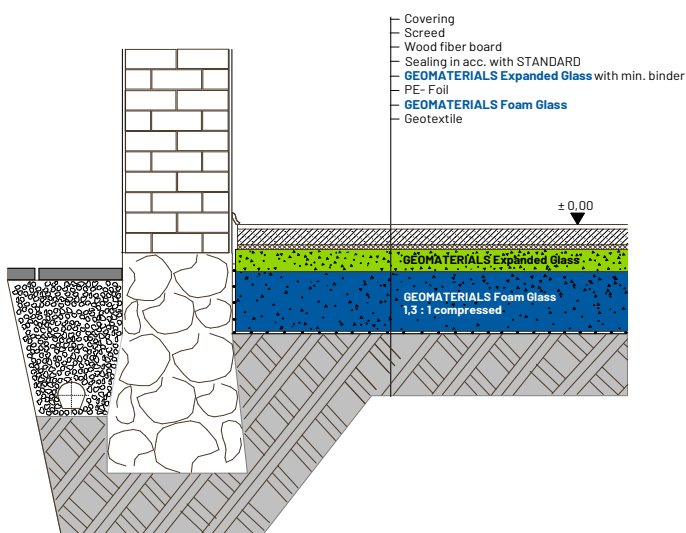
ADVANTAGES

- Suitable for the **renovation of old buildings**
- Foundation slabs and gravel are not required
- Ideal floor construction in combination with a screed layer
- **Significant lower construction height**
- **Environmentally harmless** and thus perfectly suited for living areas



- 1 Sub-grade
- 2 Geotextile if required
- 3 **GEOMATERIALS Foam Glass**
- 4 PE-Foil
- 5 Separation Layer* / **GEOMATERIALS Expanded Glass***
- 6 Compaction according to DIN / ÖNORM*
- 7 Screed (proven screed)
- 8 Exterior Insulation
- 9 Masonry

*can be eliminated



Floor construction
without ground slab

Floor renovation- combination of
GEOMATERIALS Foam Glass and
GEOMATERIALS Expanded Glass



Picture: © Vapiano, Langner Architekten & GEOMATERIALS



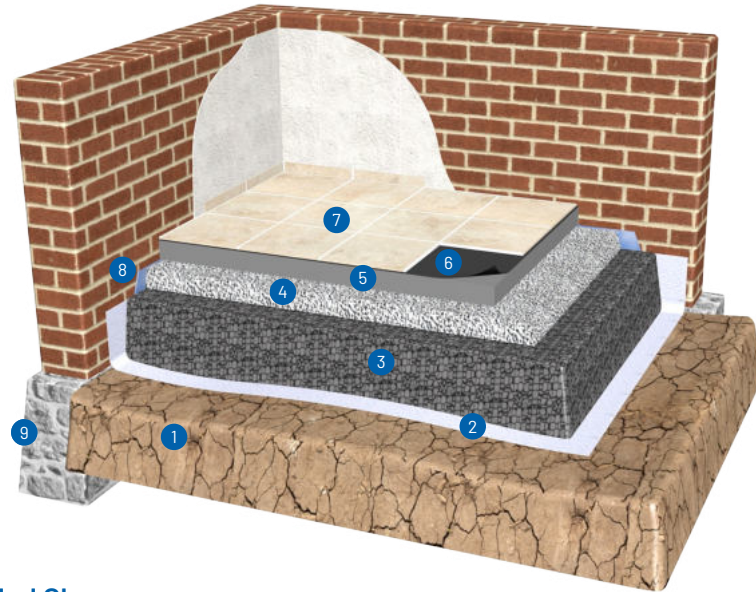
Foam glass aggregate cement-bounded,
Yard Mittergroßbefehn, Germany

When using **GEOMATERIALS Foam Glass** in combination with **GEOMATERIALS Expanded Glass** – renovation of floors is made easy.

In combination with **GEOMATERIALS Foam Glass**, which is used for rough level compensation, this is an easy, dry, moisture resistant and incombustible solution for the rebuilding of floor systems.

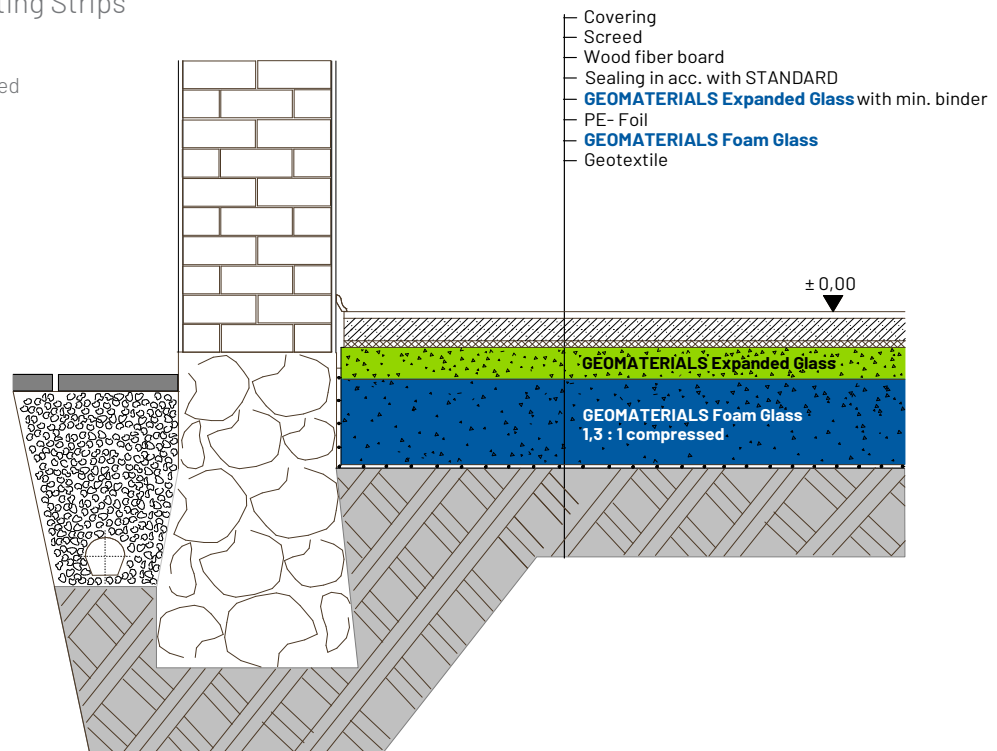
ADVANTAGES

- Suitable for the **renovation of old buildings**
- Foundation slabs and gravel are not required
- Ideal floor construction in combination with a screed layer
- **Significant lower construction height**
- **Environmentally harmless** and thus perfectly suited for living areas
- **Light as a feather**



- 1 Sub-grade
- 2 Geotextile
- 3 **GEOMATERIALS Foam Glass**
possible to use a fleece or PE-foil
- 4 Granular subbase* / **GEOMATERIALS Expanded Glass**
mineral-bounded / cement-bounded
- 5 Screed
- 6 Compaction according to DIN / ÖNORM*
- 7 Ceramic Cover
- 8 Edge Insulating Strips
- 9 Foundation

*can be eliminated



Insulation of vaults

with **GEOMATERIALS Foam Glass** and/or **GEOMATERIALS Expanded Glass**



Picture: Villa in Braunschweig, ©Cetin Sönmezocak & GEOMATERIALS



Picture: Födermayr Hargelsberg/ÖÖ, ©GEOMATERIALS



Picture: Födermayr Hargelsberg/ÖÖ, ©GEOMATERIALS



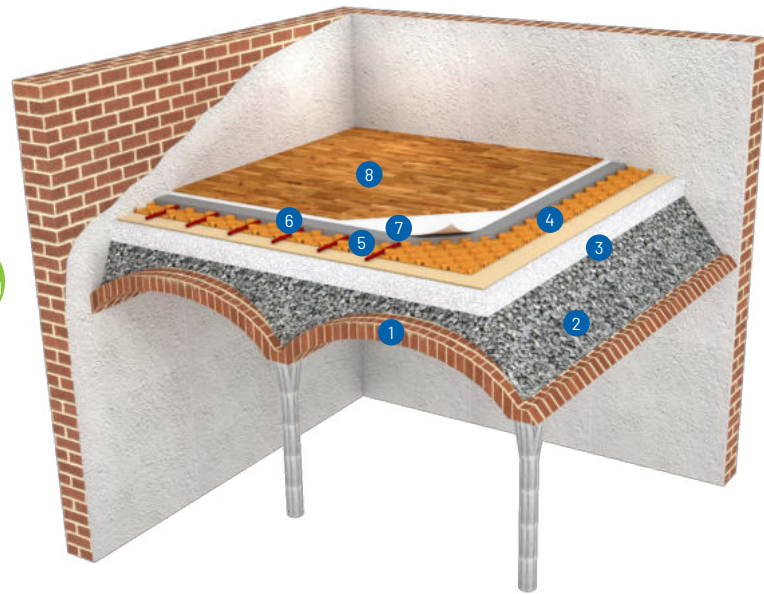
Picture: Födermayr Hargelsberg/ÖÖ, ©GEOMATERIALS

Light and moisture resistant: **GEOMATERIALS Foam Glass** relieves old vaults

Reducing weight and a slim floor structure is the key when it comes to the insulation of old vaults. It is desirable to introduce as little additional humidity as possible. **GEOMATERIALS Foam Glass** is extremely light and allows for a dry and extremely simple installation. In combination with a plug and play system for underfloor heating, **GEOMATERIALS Foam Glass** allows an ultra-thin floor structure at the highest ecological quality of living.

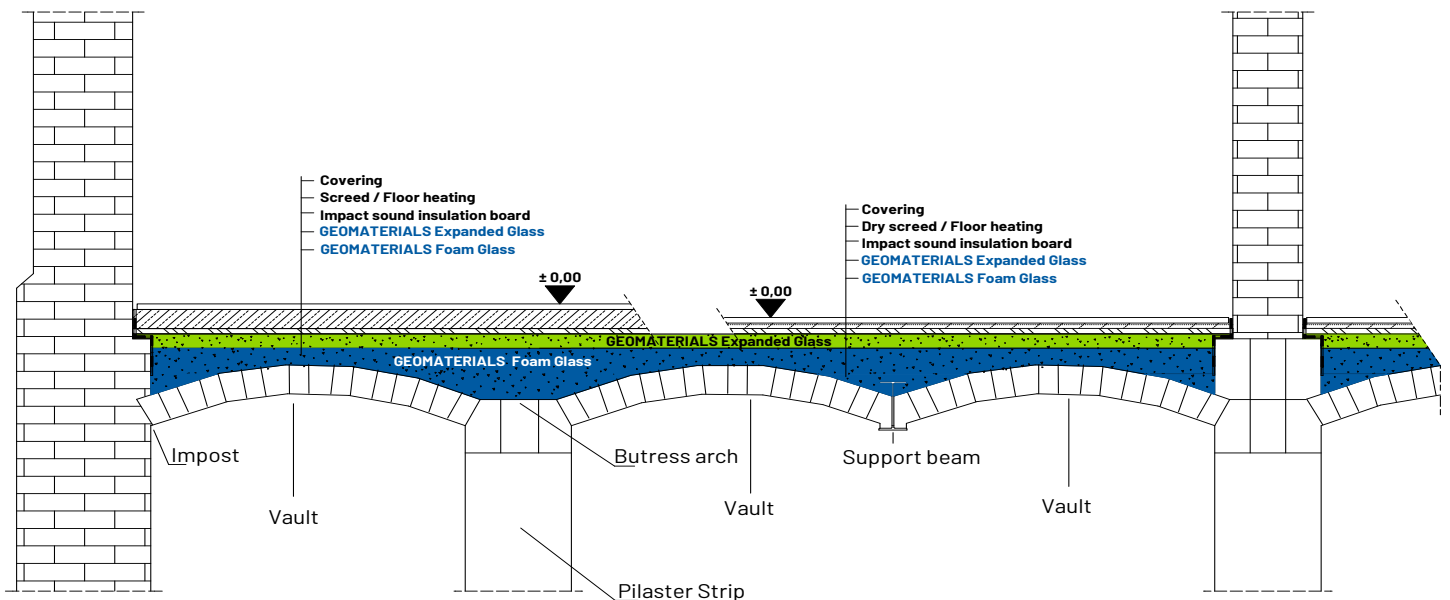
ADVANTAGES

- **Light as a feather** and hardly burdens old constructions
- Suitable for **over-insulation** of old buildings
- **Extremely low floor structure** at the highest ecological living quality
- **Moisture resistant: GEOMATERIALS Foam Glass** absorbs almost no water and dries out quickly



- 1 Vault
- 2 **GEOMATERIALS Foam Glass**
manually compacted
- 3 **GEOMATERIALS Expanded Glass**
mineral-bounded / cement-bounded
PE-Foil*
- 4 Footfall Sound Insulation
- 5 Floor heating
- 6 Screed
- 7 Fleece (Footfall Insulation)
- 8 Covering

*can be eliminated



Vertical wall- and drainage fill

with **GEOMATERIALS Foam Glass**



Exposing the masonry and making a drain



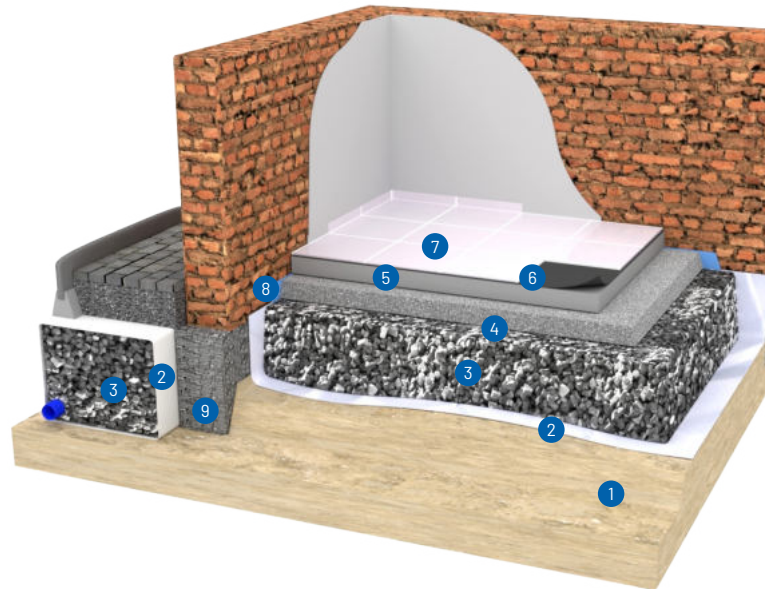
Filling in the working pit and compressing
GEOMATERIALS Foam Glass in layers



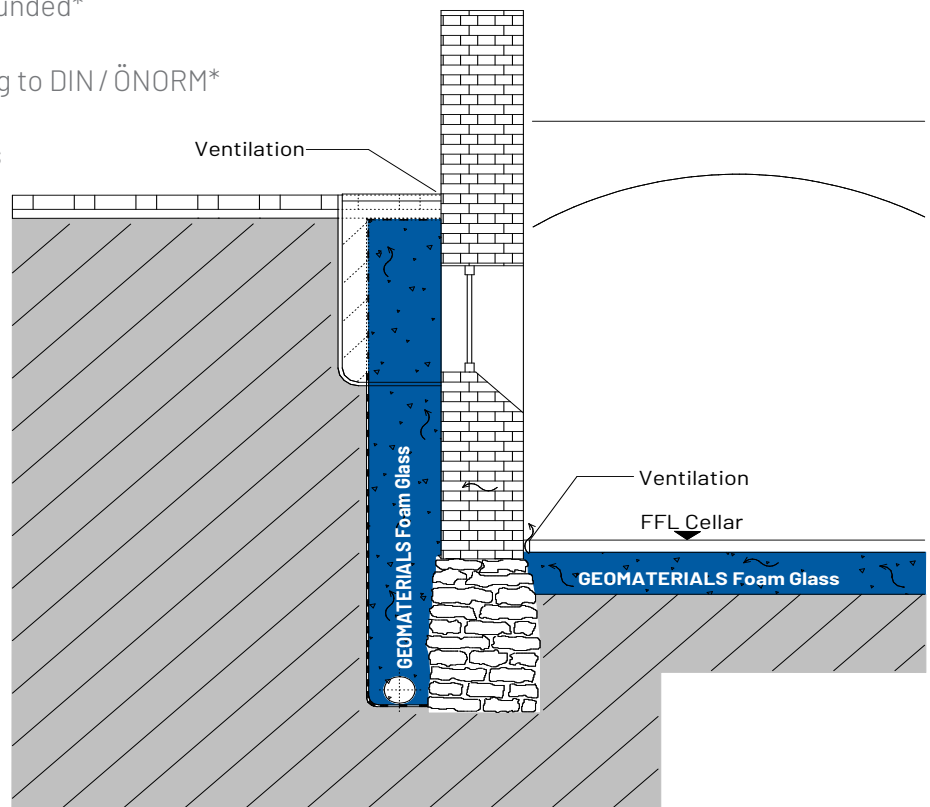
Old and humid walls require a controlled humidity exchange. In addition to the creation of a working drain, backfilling with **GEOMATERIALS Foam Glass** is a suitable method to dry-out walls.

ADVANTAGES

- **GEOMATERIALS Foam Glass** is **diffusible**. Humid walls can dry again
- **Perfect drainage** even in slopes
- Extremely rapid, simple and safe installation
- **Moisture resistant**
- Environmentally friendly and energy efficient
- Incombustible A1
- **Resistant** against aging, rotting and rodents



- 1 Sub-grade
 - 2 Geotextile
 - 3 **GEOMATERIALS Foam Glass**
possible to use a fleece or PE-foil
 - 4 **GEOMATERIALS Expanded Glass** mineral-
bounded / cement-bounded*
 - 5 Screed
 - 6 Compaction according to DIN / ÖNORM*
 - 7 Ceramic Cover
 - 8 Edge Insulating Strips
 - 9 Foundation
- *can be eliminated



Pipeline construction

with **GEOMATERIALS Foam Glass**



Picture: HTL Andorf, © Bauernfeind

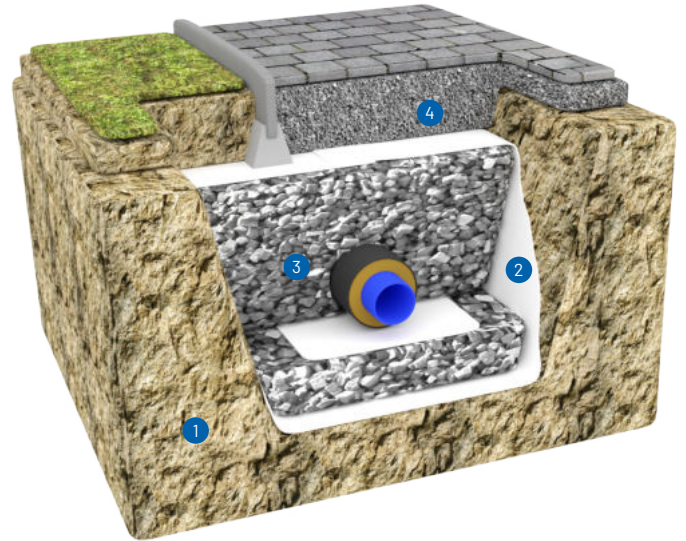


Picture: Sewage water system Lustenau, Wilhelm+Mayer

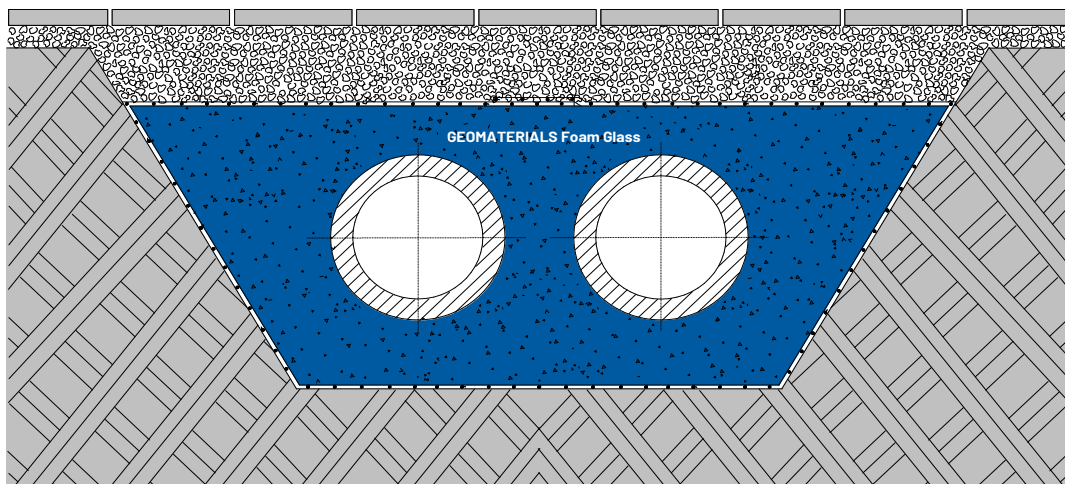
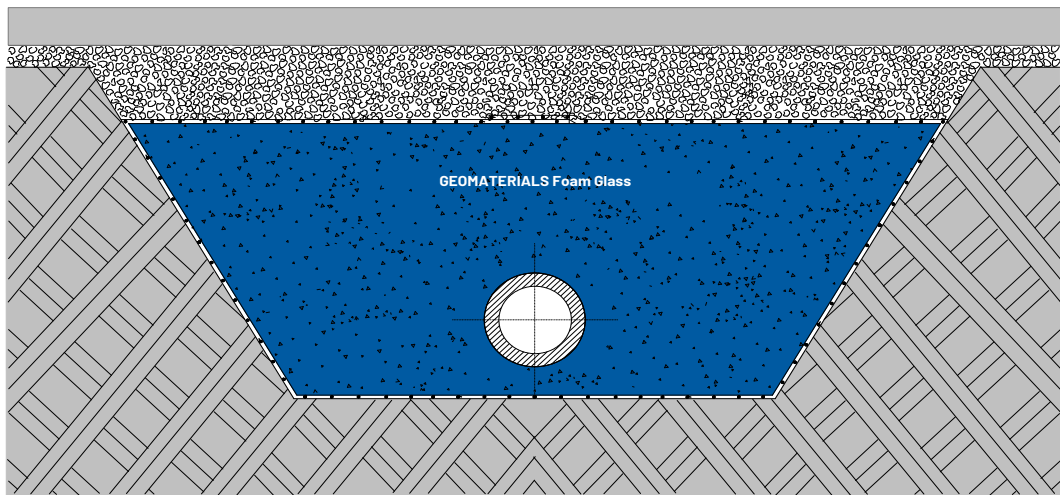
Through its special properties, **GEOMATERIALS Foam Glass** suits brilliantly for distant and local heating pipes with sub-terrain tanks, i.e. water reservoir or bio-gas plant, transmission stations and distributors. **GEOMATERIALS Foam Glass** offers as a substructure of pipelines at poor floors a solid basis and reduces thermal losses.

ADVANTAGES

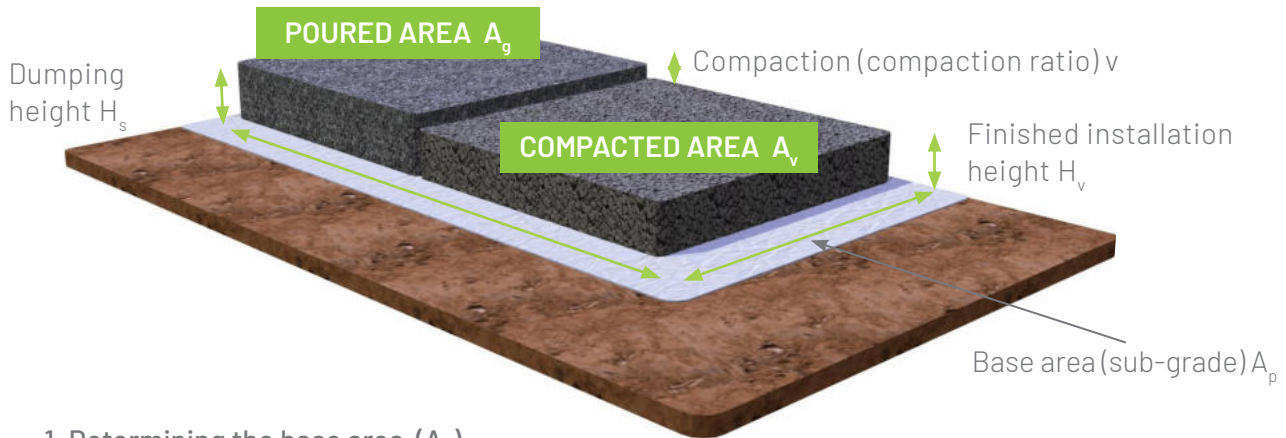
- **Weight stabilization**
- **High draining function**, cross- and alongside draining
- **Reduce thermal losses**
- **Can be modelled**



- 1 Sub-grade
- 2 Geotextile
- 3 **GEOMATERIALS Foam Glass**
- 4 Frost case



What you should know before installation



1. Determining the base area (A_p)

The base area is the area on which **GEOMATERIALS Foam Glass** must be installed. Please consider the vertical protrusion above the ground slab.

2. Determining the delivery quantity (L)

The necessary quantity results out of the product of base area, finished installation height and compaction ratio.

$$L = A_p \cdot H_v \cdot v$$

- L Quantity delivered [m^3]
- A_p Base are [m^2]
- H_s Dumping height [m]
- H_v Finished install. height [m]
- v Compression ratio

Calculation example:

$$A_p = 125 \text{ m}^2$$

$$H_v = 0,30 \text{ m}$$

$$v = 1,3$$

$$L = 125 \cdot 0,30 \cdot 1,3 \sim 49 \text{ m}^3$$

The dumping height H_s is $0,30 \cdot 1,3 = 0,39 \text{ m}$

3. Information regarding the construction site

Depending on the accessibility of the construction site, we offer various options for the installation of **GEOMATERIALS Foam Glass**. Please contact your GEOMATERIALS consultant to determine the ideal delivery form for your construction site.

Correct compaction



1,3 : 1

After a compaction of 1,3:1 **GEOMATERIALS Foam Glass** should look like this.

U-Value Calculation:

$$\frac{\lambda}{\text{Thickness (in m)}} = \text{U-Value}$$

Recommended equipment for installation of GEOMATERIALS Foam Glass

SMALLER AREAS		Lightweight vibratory plate with a strong propulsion
LARGER AREAS		Moderate, non-self-propelled and self-propelled rollers
EXTENSIVE INSTALLATION		Vibrating plate compactor

The proposed equipment gives insight into machinery alternatives for compaction, especially the manually operated plate vibrator that gives the required propulsion for a good compaction result.

TIP	<p>Please do not hesitate to contact your GEOMATERIALS consultant for the best delivery or the best compaction machine for your construction site!</p> <p>Delivery on schedule, direct discharge at the installation site and precise installation without transshipment as well as the correct selection of equipment saves time and money.</p>
-----	---

It's so easy!

GEOMATERIALS Foam Glass installation step by step

Please note: The use of **GEOMATERIALS Foam Glass** in the capillary fringe of ground-water or water source areas is not allowed. The natural ground must be well permeable to water. In the presence of cohesive or stratified soils, where accumulation or stratum water can occur, a drainage according to DIN 4095 has to be provided.



Excavation

Excavate immediately prior to the introduction of **GEOMATERIALS Foam Glass** to meet flatness and compressive strength in accordance with the object-related requirements. Unless otherwise specified, the requirements for flatness and compressive strength should be based on the principles of ZTVE – StB 94. Lay sewage pipes in pipe trenches and fill with sand on sub-grade level.



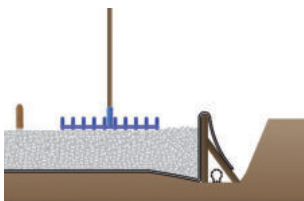
Lay the GEOTEXTILE

Set up the formwork for **GEOMATERIALS Foam Glass** and lay out the flat surface with geo-textile (150g/m²) overlapping. Provide sufficient overhang so that the finished fill can be completely packed later. Position splice bars marking the compacted (final) height of **GEOMATERIALS Foam Glass**, at regular intervals.



Install **GEOMATERIALS Foam Glass**

If **GEOMATERIALS Foam Glass** is delivered loose, it is offloaded directly into the excavated pit. Above the installation site, the Big Bags have to be lifted and opened from below with the help of an excavator or crane.



Distribute **GEOMATERIALS Foam Glass**

At smaller sites, level **GEOMATERIALS Foam Glass** uniformly to the marked height using an excavator shovel and rakes. For larger construction sites a mechanical distribution is carried out before the head by a charger or a shovel. Driving over the uncompacted material should be avoided, as pre-compaction increases material consumption.

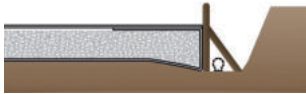


Compact **GEOMATERIALS Foam Glass**

For small sites, compacting shall be performed by a lightweight vibration plate (weight: 80-100 kg, frequency: 85-100 Hz, supporting area: 50 cm, straight running). For areas > 200 m² you can use a soil compactor. A compression exceeding the specifications, results in a higher material consumption, but does not have any negative impact on the technical properties. For design thickness greater than 30 cm, **GEOMATERIALS Foam Glass** must be dumped in two layers and each layer has to be compacted. The flatness of the surface has to be made before the compacting process, so that at least a flatness tolerance of +/- 3 cm in relation to a length of 4 m is achieved.

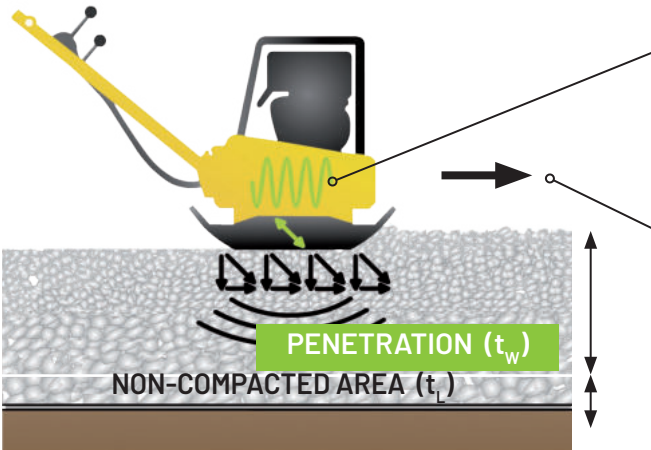
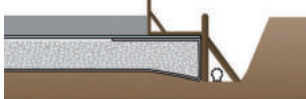
Lay the separation layer

After completion of compression, the Geotextile is wrapped-up laterally and the entire **GEOMATERIALS Foam Glass layer** is covered with a PE-foil to protect against cement residue.



Install formwork for foundation slab

Place the formwork for the floor slab directly on the prepared surface and create the floor slab according to the specification. The ring drainage (sewer pipes) is laid around the pit after the formwork has been removed.



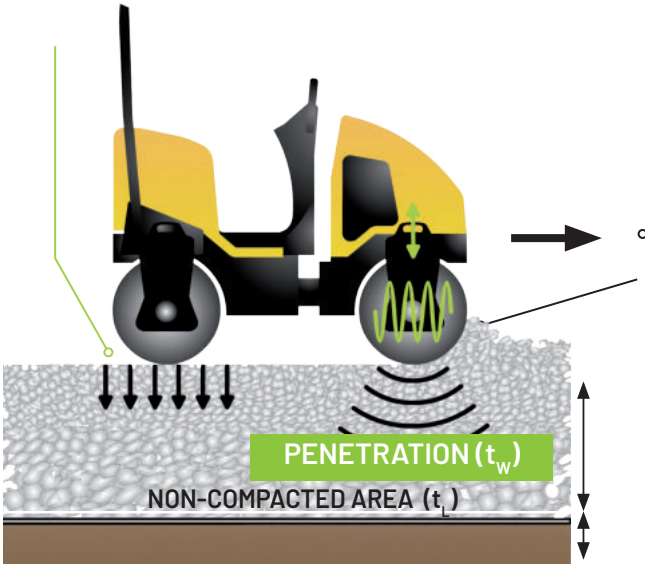
COMPACTION WITH A VIBRATORY PLATE

Generation of the dynamical compaction energy depending on the dwindling mass. Frequency [Hz] Centrifugal Force [kN]

Working direction and working speed activated through the exciter system.

**THIS IS HOW IT IS COMPACTED:
Static load + dynamical compaction energy**

Static line load (p) through operation weight



COMPACTION WITH A ROLLER

Working direction and working speed activated through the exciter system.

Amplitude (a) through exciter frequency

**THIS IS HOW IT IS COMPACTED:
Static load (operating weight) + dynamical compaction energy**

Tips for extensive installation

LEGEND

Working direction of the manual whacker



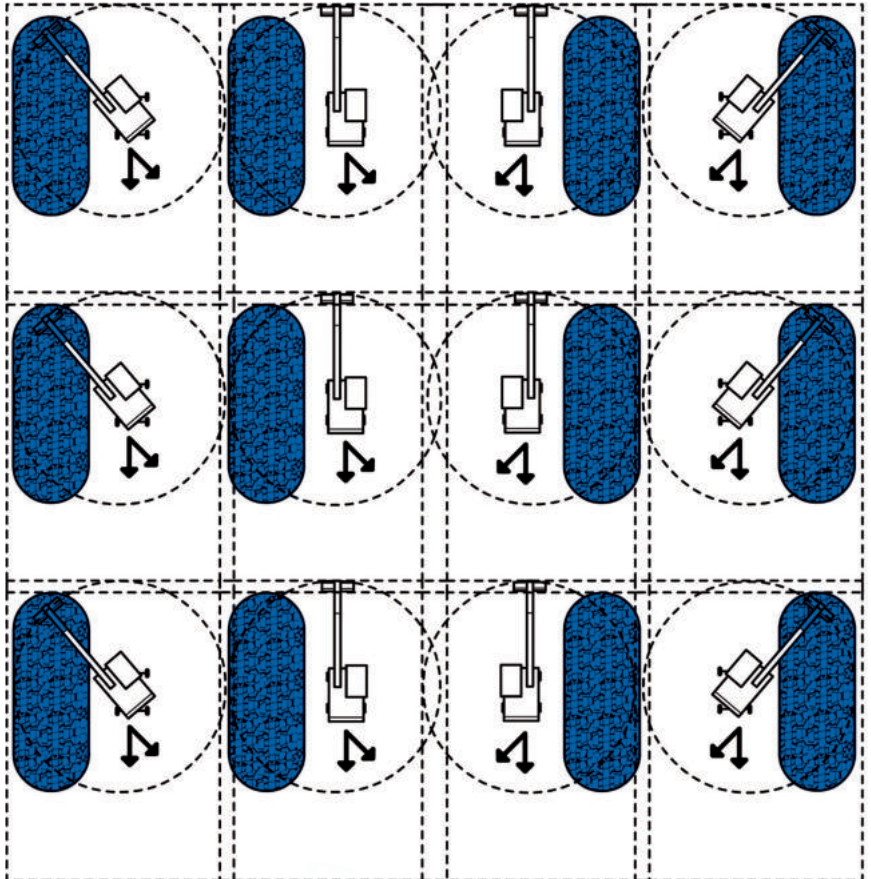
Angle of repose after offloading trough a walking floor truck



Manual whacker
<= 12 t
Shovel
>= 1,8 m³
without teeth



Precalculated area on which the loading volume should be distributed



Extensive installation of **GEOMATERIALS Foam Glass** for a production hall

Possibilities for delivery and installation



Delivery of bulk material with a walking floor truck

This form of delivery is suitable for construction sites, which can be easily reached. A walking floor truck cannot tilt, but rather shuffles the material with its moving floor from back to front.

Typical dimensions: LxWxH = 18 x 4 x 2,8 m

Loading capacity: 85 - 95 m³ depending on type of truck
Non steerable axles!



Delivery of bulk material with a container truck

This form of delivery is suitable for narrow access roads. The bulk material is divided into the towing vehicle and a trailer. Therefore the material can be brought step by step. Please mind: through the minimized quantity and the additional expense, we charge an extra container surcharge.

Typical dimensions towing vehicle: LxWxH = 9 x 4 x 2,8 m

Loading capacity: 76 - 80 m³ depending on type of truck



Delivery packed in Big Bags

We also offer the material in packaged form (disposable packaging):

GEOMATERIALS Schaumglas Big Bag 1,5 m³

GEOMATERIALS Schaumglas Big Bag 2 m³

GEOMATERIALS Schaumglas Big Bag 3 m³

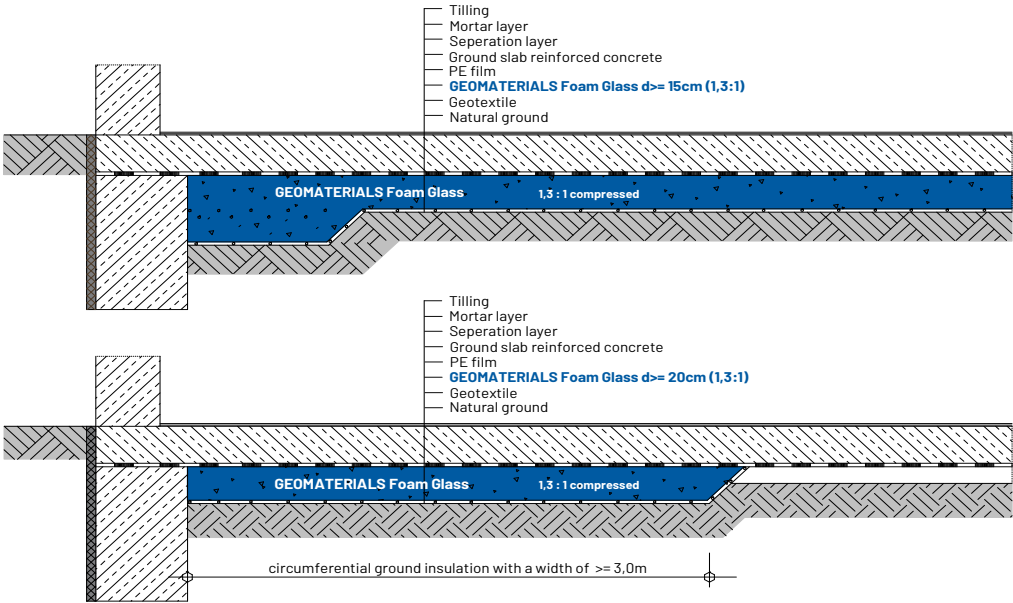


Installation with a dispensation-towel

Especially for stepped, impassable areas, there is the possibility to install the bulk material with the help of a dispensation-towel. The material is conveyed from the walking floor truck into the towel, spread on the ground with a capacity of 12 m³. The dispensation-towel can be moved with a crane. The distribution of the material happens through the outlet spigot. We gladly provide the dispensation-towel for a daily fee.

Extensive application

For business and industrial objects



Surface insulation of a warehouse.

Fringe insulation surrounding floor insulation with a width of >= 3 m

HIGH THERMAL INSULATION:
Full surface exterior thermal insulation



NON-CAPILLARY:
Replaces the capillary-breaking layer



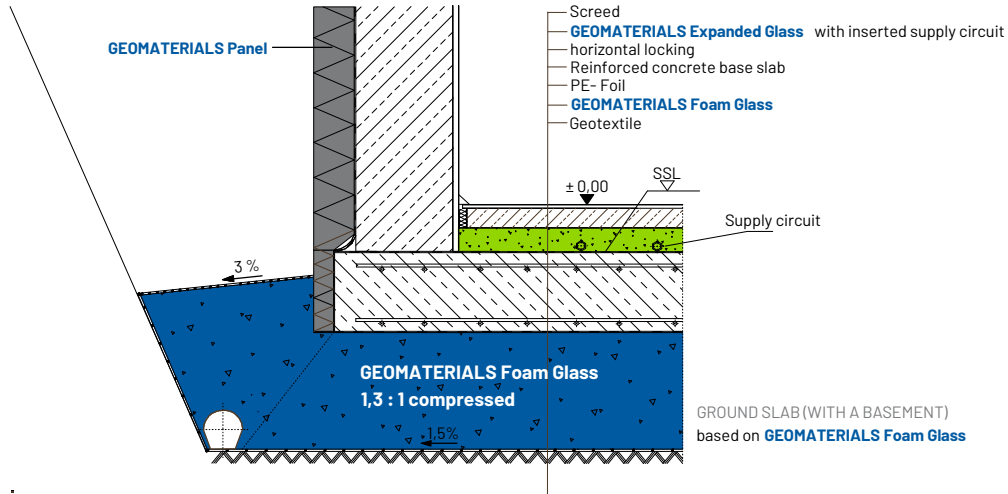
LOAD BEARING:
Highly resistant in industrial construction



COST AND ENERGY SAVING:
Especially in extensive installation

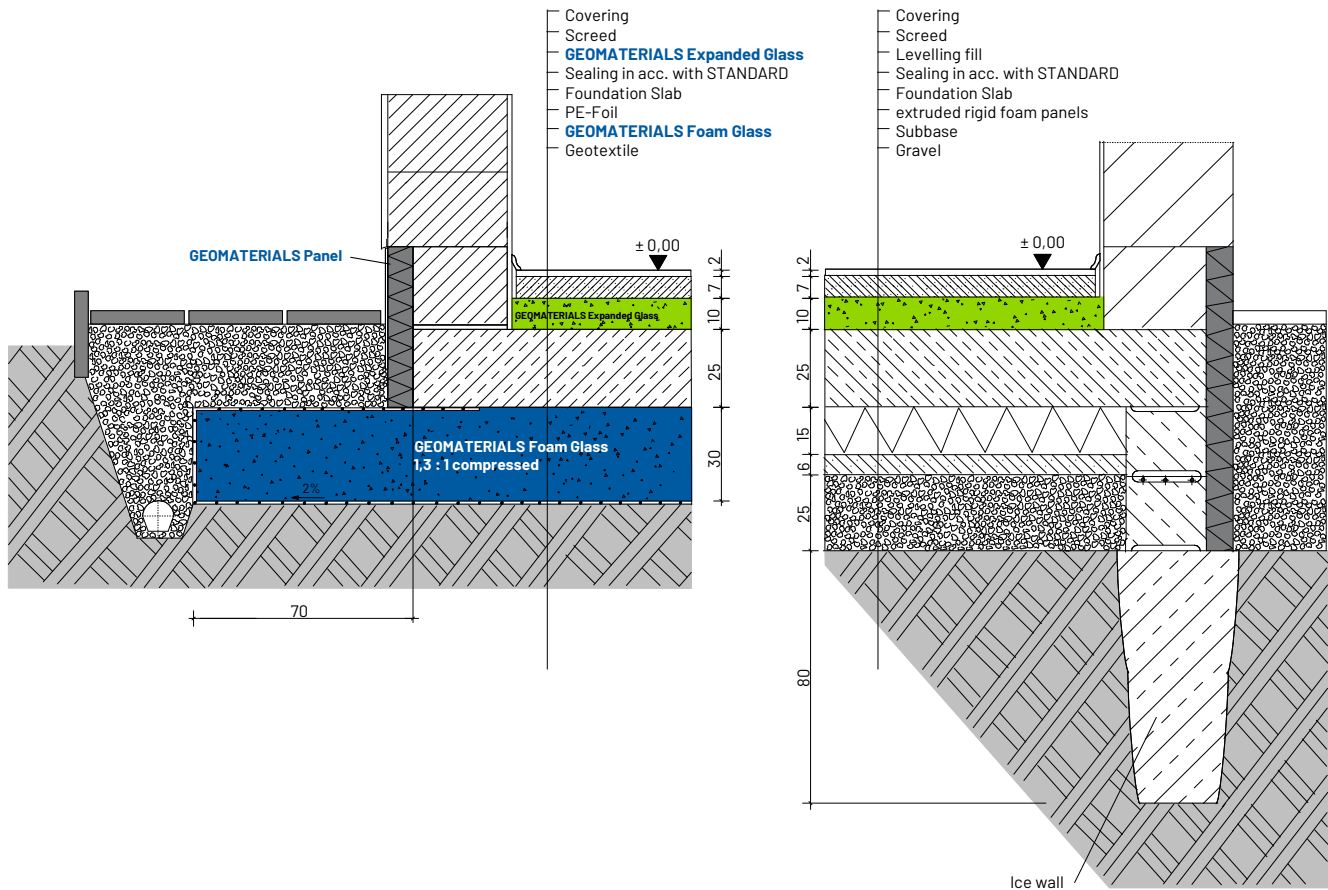


Concrete floor slab with a basement/slope



Saving construction costs

with **GEOMATERIALS** Foam Glass



- Load bearing insulation with high sustainability
- No gravel necessary
- Strip-foundation can be eliminated
- Significantly lower construction height with **GEOMATERIALS** Foam Glass
- Saving working time
- Thermal bridge free construction
- Possibility for a component-activated ground slab (with a screed)

GEOMATERIALS Foam Glass – the fundamentally better alternative for all applications



Picture: Home-Center Kröll & Winkler, Taxenbach, Salzburg
© Kröll & Winkel GmbH & Co KG, GEOMATERIALS



Picture: Primary School in Unternberg, Salzburg
© WISA-Bau GmbH, GEOMATERIALS



Picture: Cardinal Schwarzenberg Medical Center, Schwarzach i. Pongau, © Mrazek, Wörner Traxler Richter, GEOMATERIALS



Picture: Veterinary Clinic Dourakas, Schweiggers, Lower Austria
© Dourakas, GEOMATERIALS



Picture: METRO, St. Pölten, Lower Austria
© GEOMATERIALS



Optimal performance down to the last detail—GEOMATERIALS Schaumglasschotter SGS

Load-bearing insulation material—DIBT Approval Z - 23.34 - 1579 + BTZ-0044			
Load-bearing bulk material – DIN EN 13055-2/2004			
Particle size distribution	EN 933-1	10-60	mm
Bulk density, dry ⁽¹⁾	EN 1097-3	130-170	kg/m ³
Shear parameters for internal friction ⁽²⁾	Factory spec.	42-45	°
max. water absorption at 30% compression	Factory spec.	≤ 40	M %
max. water absorption per individual particle	EN 1097-6	≤ 10	V %
Water permeability in fill after 30% compression	EN 18130-1	≥ 10 ⁻³	m/s
Bulk density of individual particle	EN 1097-6	0.220-0.300	g/cm ³
Porosity of individual particle	Factory spec.	85-88	%
Unconfined compressive strength of individual particle	EN 17892-7	≥ 0.8	N/mm ²
Unconfined compressive strength with transverse strain prevented at 30% pre-compression and a further 10% compression ⁽³⁾	EN 826	≥ 580	kPa
Thermal conductivity (dry) ⁽⁴⁾	EN 12667	≤ 0.0800	W/mk
Cohesion (calculation value)	c	0.00	kN/m ²
Condensation	Prevents condensation in the building component		
Frost resistance ⁽⁵⁾	GEOMATERIALS Foam Glass is verifiably frost-resistant		
Diffusion properties	Breathable		
Capillarity ⁽⁶⁾	GEOMATERIALS Foam Glass is non-capillary and thus resistant to rising water		
Fire behavior	A1: Non-combustible material as per DIN 4102-1		
Resistant against environmental influences	GEOMATERIALS Foam Glass is resistant against aging, acids and alkalies, rodents, bacteria, and rot.		

There are no restrictions on the use of GEOMATERIALS Foam Glass in protected areas as per the provisions relating to water management and water law set out in the German Federal Soil Protection Act (BbodSchG).

(1) Taking into consideration the proportion of bound water on the surface of the particle

(2) According to factory specifications

(3) According to the German National Technical Approval: unconfined compressive strength test in accordance with standard DIN EN 826 (1996-05)

(4) According to the German National Technical Approval: thermal conductivity test in accordance with standards DIN EN 12667 and DIN EN 12939

(5) According to the specifications of German National Technical Approval No. Z-23.34 - 1579, the manufacturer of GEOMATERIALS Foam Glass is required to demonstrably guarantee the frost resistance of the material by measuring its freeze-thaw fluctuating behavior (DIN 52 104-1) in its certificate of conformity

(6) Non-capillary characteristics result from the low proportion of fine particles and the void content

All specifications on technical parameters are minimum specifications. The manufacturer can exceed these by providing evidence in the form of the factory production control (FPC).

The technical guidelines for the application and installation of GEOMATERIALS Foam Glass are based on previous experience and the current state of technology. They are not based on an individual case. In light of this, we assume no liability for the completeness and suitability of a particular project. Furthermore, the scope of our liability and responsibility is governed solely by our general terms and conditions and cannot be extended either by statements made in this brochure or by advice given by our technical consultants.



SCHLÜSSELBAUER 
GEOMATERIALS

SCHLÜSSELBAUER Geomaterials GmbH
A-4673 Gaspoltshofen
Tel.: +43(0)7735 67 220
kontakt@geomaterials.eu
www.geomaterials.eu