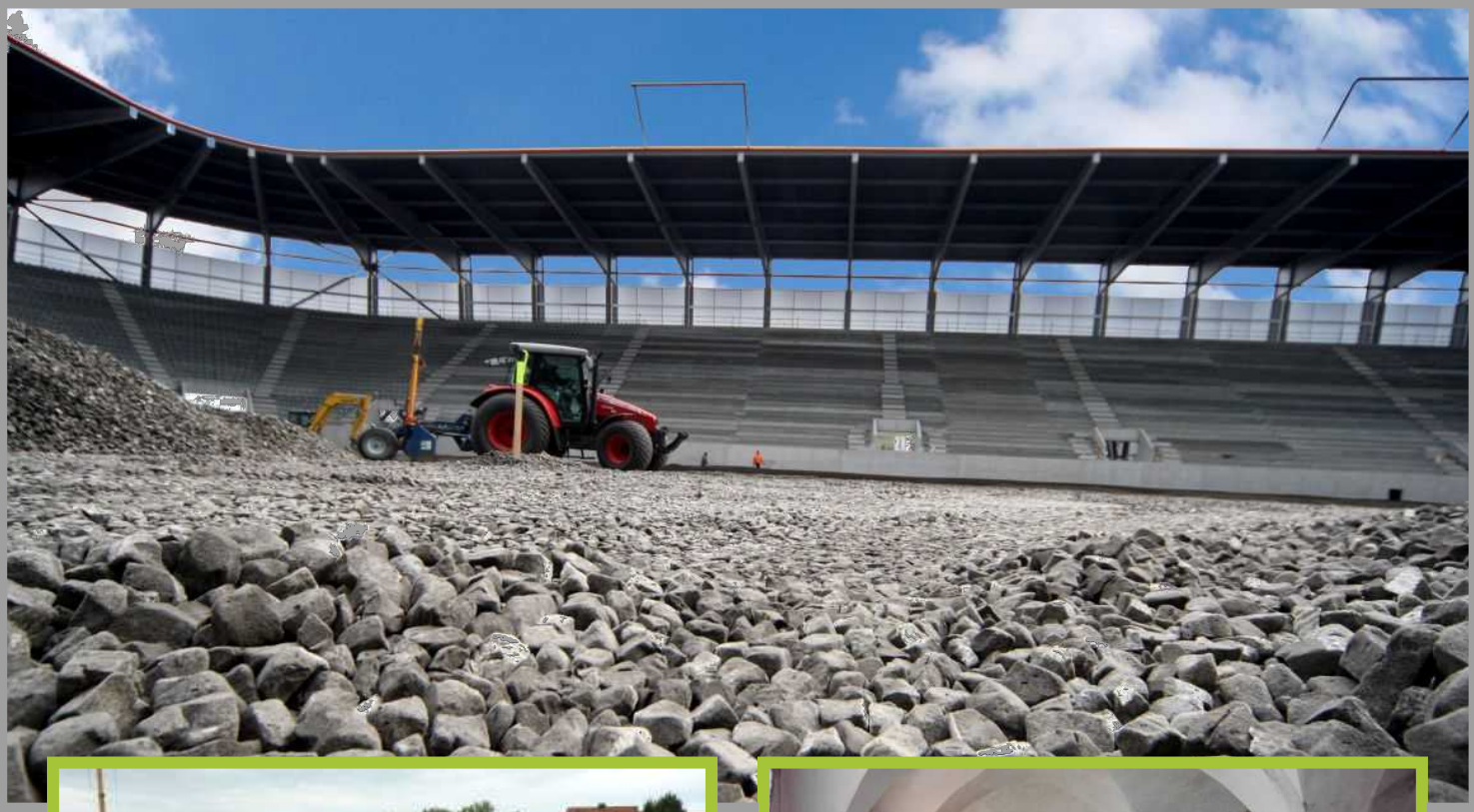
GEOCELL® FOAM GLASS GRAVEL

GEOCELL
FOAM GLASS GRAVEL

HIGH PERFORMANCE IN EVERY ASPECT



THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

WHAT IS GEOCELL?

Manufactured from 100% recycled WASTE GLASS

Ecofriendly insulation for floor construction and foundations.
Independently approved thermal and load bearing properties.
Cost saving compared to conventional floor construction.
Manufactured from 100% recycled waste glass.
Low embodied carbon - Sustainable - Lightweight - Easy to handle.
Reduced construction time and costs.

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ADVANTAGES OF GEOCELL

INSULATING

GEOCELL foam glass gravel consists of millions of closed cells, the air locked inside these cells are responsible for GEOCELL's outstanding insulating properties - 0.080 W/mK.

FREEZE-THAW RESISTANT

GEOCELL does not react to the freeze-thaw cycle and thus effectively protects against the impact of frost. No additional frost protection is required.

LIGHTWEIGHT

With a dry bulk density of approx 150kg/m³, GEOCELL is extremely lightweight making installation quick and easy.

ANTI-CAPILLARY

With its closed cell structure, GEOCELL forms a capillary break keeping moisture away from the building fabric resulting in no mould growth and structural damage.

DRAINAGE

With GEOCELL, rain water is immediately drained away from the building whilst offering the additional advantage of insulating the outside of existing walls.

LOAD-BEARING

Due to its glass cell structure, GEOCELL provides excellent compressive strength - 275 KN/m² (27.5 tonne/m²) at compaction factor 1.3 : 1.

SAVING WITH GEOCELL

- Less excavation.
- All-in-one foundation in a single step.
- Compensating and adaptable, no cutting required.
- Easy insulation of pipes.
- Considerable saving in terms of construction time due to fast installation.

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TECHNICAL DATA

APPROVALS			STANDARD
Building Material Approval		DiBt Z-23.34-1579	
THERMAL CONDUCTIVITY			
Thermal Conductivity (dry) (1)	λ_{90}	<0,08 [W/mK]	DIN EN 12939v
Thermal Conductivity (Design Value)	λ_{bem}	0,11 [W/mK]	
LOAD CAPACITY			
Design value of compressive strength at compaction factor 1:1,3 (2)	σ_{cd}	275 [kN/m²]	DIN EN 1054/1055
Compressive strength (10% compression) (3)	$\sigma_{10\%}$	≥570 [kN/m²]	DIN EN 826
GENERAL DATA			
Delivery		bulk or BigBags	DIN EN 18123
Density (dry bulk)(4)		approx. 150 [kg/m³]	DIN EN 1097-3
Granular size	K	approx. 10-60 [mm]	DiBt Z-23.34-1579
Internal water absorption	w_i	0,00 [Vol%]	factory data
Water adsorption (5)	w_a	<10,00 [Vol%] (reversible)	factory data
Friction angle (at compaction 1:1,3) (6)	Φ	45-48°	factory data
Cohesion (design value)	C	0 [kN/m²]	factory data
Apparent cohesion (design value)	C_s	0 [kN/m²]	factory data
Design value for shear stress (7)	Φ	35°	
Water permeability	K_f	~ 4,4 * 10-2 [m/s]	
Condensation		prevents condensation in the building component	
Freeze-thaw (8)		frost resistant	factory data
Diffusion properties	μ	diffusible	factory data
Gassing with heat		no gas emission, odor free	factory data
Capillarity (9)		anti-capillarity against rising water	factory data
Fire resistance		incombustible class A1	DIN 4102-1
Resistance to environmental influences		anti-aging, rodent-, bacteria- and rot-resistant	factory data
Material radiation		no radiation or odors	factory data
Alkali resistance		long-term stability, no damage to concrete	factory data
Environmental impact		considered unpolluted excavation. Eluate test met. Meets BbodSchG guidelines.	

(1) according to the General Technical Approval: testing of the thermal conductivity according to DIN EN 12667 and DIN EN 12939
(2) allowable compressive stress in compliance with global safety factors for verification according to DIN 1054, 1976-11
(3) as specified by the General Technical Approval: Uniaxial compression test test according to DIN EN 826 (1996-05)
(4) Taking into account the weight proportion of adsorbed water on the grain surface
(5) free and bound water at the particle surface
(6) factory data
(7) horizontal forces introduced into the insulating material may not exceed 20% of the design value of normal stress.
(8) According to the guidlines of the General Technical Approval Z – 23.34 – 1579 dd. 26/02/09 the manufacturer of GEOCELL is requested to measure freeze-thaw fluctuating (DIN 52 104-1) on a regular basis
(9) capillary property of the material is obtained even after compression due to exisiting voids

Note: **For processing GEOCELL cellular glass gravel please refer to our guideline 01/2010, May 2010.**

THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

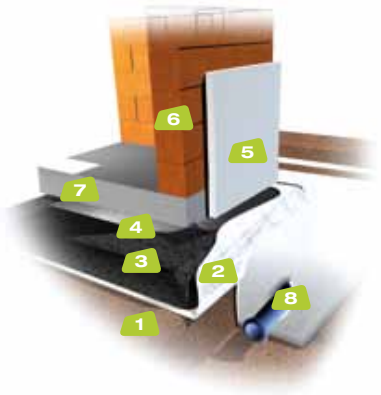
APPLICATIONS - BUILDING INSULATION

BUILDING INSULATION BELOW FLOOR SLAB

The benefit of a GEOCELL® insulation under the floor slab is a structure without thermal bridges. Since it is an exterior insulation, heat cannot dissipate. Thus, there is no water condensation and as a consequence, no mould formation appears.

ADVANTAGES

- Suitable for THERMAL INSULATION under the foundation slab of single/multi family houses, production halls, schools, swimming pools and ice rinks, etc.
- HIGHER COMPRESSIVE STRENGTH than other competing materials. Simpler and more cost-effective installation technology
- Single steps such as grading excavation, gravel installation and laying insulation boards can be eliminated.
- NO FROST BARRIER REQUIRED



1 planum/formation level
2 geotextile
3 GEOCELL®
4 PE-foil
5 wall insulation
6 exterior wall
7 concrete floor slab
8 drainage pipe

BUILDING INSULATION EXISTING FLOOR RENOVATION

The selection of appropriate insulation material is especially crucial in old buildings. GEOCELL® combines drainage layer and insulation in a single product, thus reducing building height. Moreover, GEOCELL® is diffusible, an important property for an insulating material when humidity is an issue.

ADVANTAGES

- LIGHT-WEIGHT GEOCELL® is a fraction of the weight of gravel. This makes it easy to transport and work with
- STRONG excellent compressive strength
- WATERPROOF thanks to the closed cell structure, GEOCELL® is completely unaffected by water
- ENVIRONMENTALLY GREEN
  GEOCELL® is made from waste glass and can be reused or recycled at any time

1 planum/formation level
2 geotextile
3 GEOCELL®
4 PE-foil
5 subbase*
6 sealing*
7 screed
8 wall insulation
9 exterior wall

*if required

THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

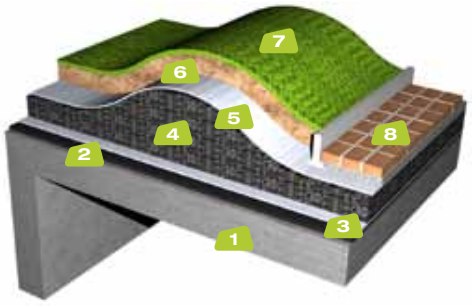
APPLICATIONS - LANDSCAPING

LANDSCAPING LIGHT WEIGHT MATERIAL FOR GREEN ROOFS

GEOCELL® is easy to handle and can be driven over and walked on during construction. It is resistant to rotting, maintains its form and thanks to its high insulating properties, prevents frost damage. Ideal for landscaping and gardens. With a density of less than 150 kg/m³ and a 45 degree repose angle, GEOCELL® can be used effectively on roof construction - from flat roofs to underground parking garages and tunnels.

ADVANTAGES

- **LIGHT WEIGHT MATERIAL:** saves structural design
- **NON COMBUSTIBLE:** Classified as an A1 building material
- **MOULDABLE;** a 45 degrees repose angle allows creative roof design
- **INSULATES AND DRAINS** prevents frost damage



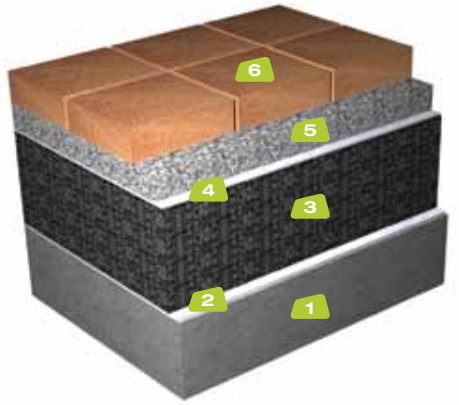
1 concrete roof/tunnel/car park
2 sealing
3 geotextile
4 GEOCELL®
5 geotextile
6 substratum
7 vegetation
8 pavement

LANDSCAPING LOAD-BEARING CONSTRUCTION

GEOCELL® not only reduces the applied load, but is also load bearing. Pavement for paths and roads can be laid directly in a leveling layer on the compacted GEOCELL. Even blacktopping directly on GEOCELL® is possible. Due to the lightness of the material, there are hardly any restrictions for the creative landscape architect.

ADVANTAGES

- **LIGHT-WEIGHT GEOCELL®** is a fraction of the weight of gravel. This makes it easy to transport and work with
- **STRONG** excellent compressive strength
- **NON COMBUSTIBLE:** Classified as an A1 building material



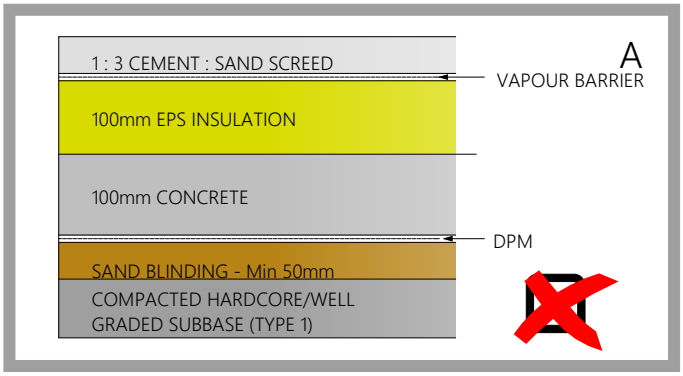
1 building / basement ceiling
2 geotextile / sealing as required
3 GEOCELL®
4 geotextile
5 load balancing layer
6 upper surface: concrete blocks (drain pavement), natural stone or wood covering

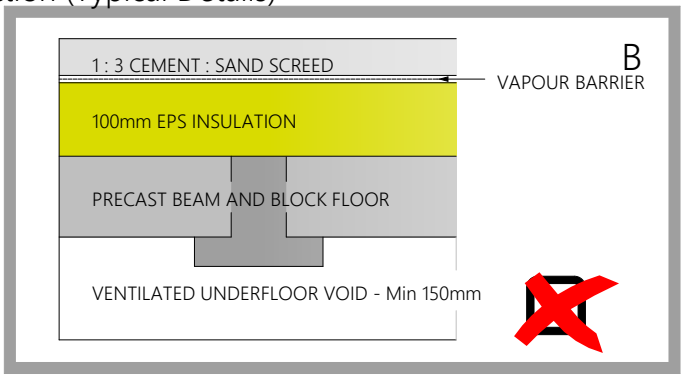
THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

CONSTRUCTION DETAILS

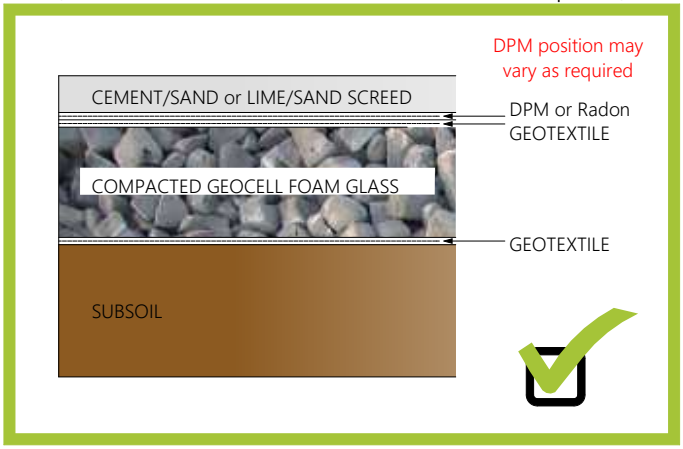
DOMESTIC BUILDING - GROUND FLOOR CONSTRUCTION
Conventional Construction (Typical Details)



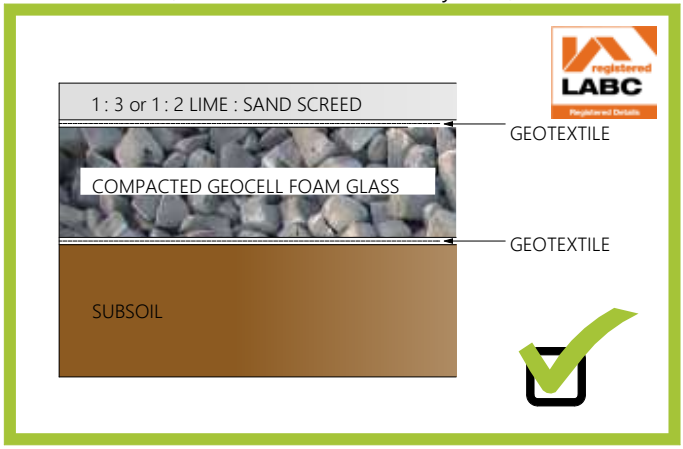


THE ECOLOGICAL ALTERNATIVE INCORPORATING GEOCELL

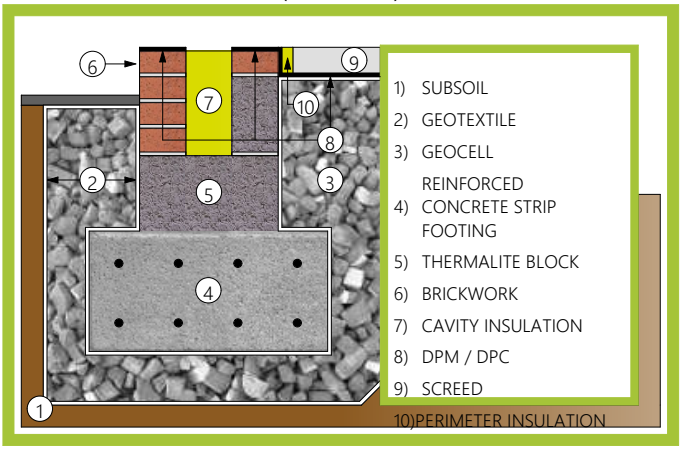
GROUND FLOOR - NEW BUILD
(Or renovation if DPC or Radon barrier is required)



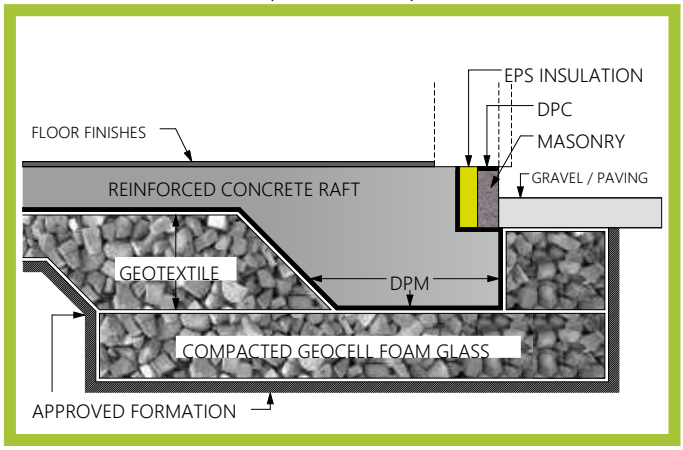
GROUND FLOOR - RENOVATION
(Breathable GlassCrete system)



INSULATED FOUNDATION DETAIL
(Domestic)



INSULATED FOUNDATION DETAIL
(Commercial)



THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

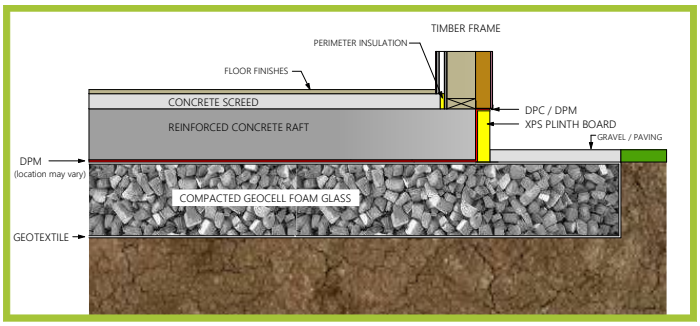
GEOCELL® FOAM GLASS GRAVEL

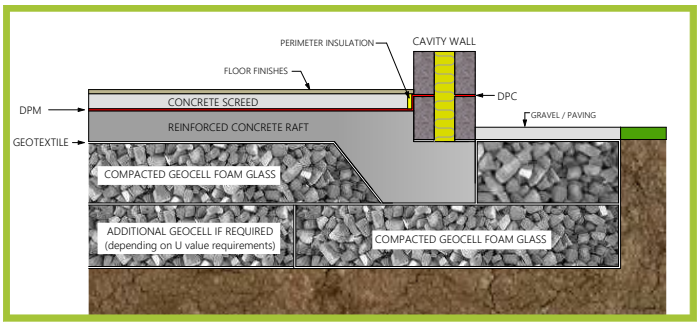
FOUNDATION DETAILS

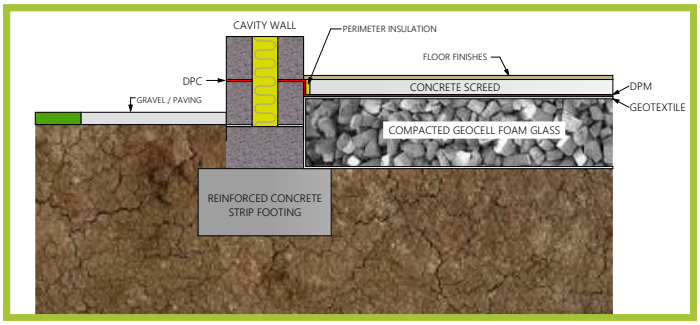
Foundation system using GEOCELL recycled foam glass gravel to form a load bearing, thermally insulated foundation. This simple solution offers substantial advantages including high insulation values and fast construction times which are cost saving, as well as being sustainable.

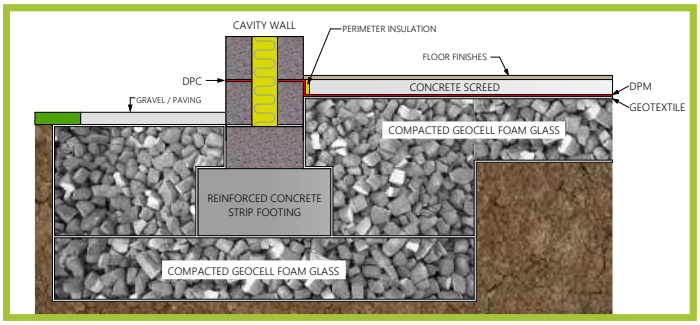
With GEOCELL's excellent thermal performance passive house standards are achieved without the need for additional insulation products.

EXAMPLE FOUNDATION DETAILS - FOOTINGS & RAFT TO ENGINEERS DETAIL









THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

DESIGN DATA

GEOCELL is an aerated foam glass gravel manufactured from 100% recycled waste glass.

GEOCELL is light weight material having a loose bulk density of approx 150kg/m³.

Uses of GEOCELL include:

- Load bearing thermal insulation beneath floor slabs providing a complete replacement for conventional hardcore, blinding, oversite concrete and expanded polystyrene construction or precast beam and block and polystyrene insulation flooring.
- Load bearing thermal insulation beneath foundations.
- Light weight fill for landscaping including french drains.

GEOCELL is chemically inert and complies with requirements for environmental compatibility.

GEOCELL does not present any hazard to the health and safety of persons involved with its installation or use.

GEOCELL offers: frost resistantance, prevents condensation in the building component, self-draining, diffusible, no gas emission and odor free, anti-capillary against rising water, incombustible class A1, anti-aging, rodent, bacteria, and rot resistantance, long-term stability, no damage to concrete.

Design characteristics of GEOCELL:

Nominal value for compressive strength $f_{c.nom}$	Nominal value for compressive stress $f_{cd.} = f_{c.mom}/Y_M \cdot \alpha$
570 kPa	275 kPa
>570 (kN/m²)	275 (kN/m²)

For full details see GEOCELL Technical Data Sheet

THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

DESIGN DATA

Design thickness of GEOCELL :

- Minimum compacted thickness of GEOCELL 10/60 is 150mm.
- Maximum compacted single layer thickness 300mm.b
- For design thickness greater than 300mm, placing and compaction is to be undertaken in two or three layers.
- Maximum compacted thickness beneath floor slabs and foundations is 900mm.
- Compaction ratio i.e. loose material to compacted state is 1.3 : 1.

U - Values achieved using GEOCELL in situ :

(Example based on design area of 50m² with 25m exposed perimeter and clay subsoil)

U - Values (W/m²K)	Loose thickness (mm)	Compacted thickness (mm)
0.29	195	150
0.24	260	200
0.21	325	250
0.19	390	300
0.14	585	450
0.09	975	750

U - Values of GEOCELL as stand alone material :

U-Values (W/m²K)	Loose thickness (mm)	Compacted thickness (mm)
0.53	195	150
0.40	260	200
0.32	325	250
0.27	390	300
0.18	585	450
0.11	975	750

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GEOCELL® FOAM GLASS GRAVEL

PROJECT REFERENCES

Basement insulation, under slab as well as backfill, rooftop insulation and road construction: GEOCELL is an all-rounder with many benefits, cutting construction time and costs

THE FUNDAMENTAL ALTERNATIVE FOR MANY APPLICATIONS:

1

2

3

4

5


6


7


8

9

1 Passive house, Bruck/Waasen, Austria
2 Renovation of a historc basement and arch, Stadtkeller Pregarten, Austria
3 Passive house, Auleiten, Austria
4 Kindergarden (Passive house standard) Siloah, Hannover, Germany
5 Low-energy supermarket Vienna, Austria
6 Glachau Castle Renovation, Germany
7 AFG Fußball-Arena, St.Gallen, Switzerland
8 Passive house kindergarden, Robert Koch Strasse, Wels, Austria
9 Highschool, Lappersdorf, Germany

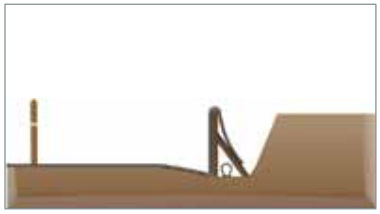
THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

INSTALLATION AND COMPACTION

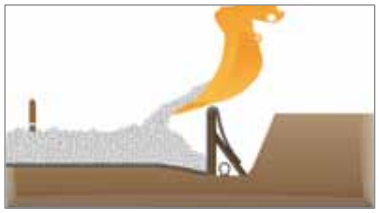
EXCAVATION

Excavate immediately prior to the introduction of GEOCELL® to meet flatness and compressive strength in accordance with the object-related requirements. Excavate to formation level and trim/remove any loose material to provide a uniform flat surface. Lay sewage pipes in pipe trenches and fill with sand on subgrade level.



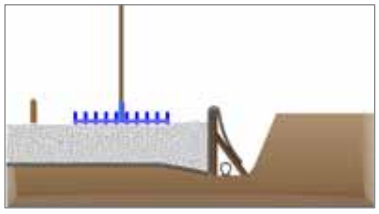
LAY GEOTEXTIL

Install auxiliary formwork for GEOCELL® and install non-woven geotextile 150g/m² separation membrane which is to be wrapped up the edges of the completed GEOCELL® installation and overlapped with the surface geotextile.
Position splice bars marking the compacted (final) height of GEOCELL®, at regular intervals.



INSTALL GEOCELL®

Filling in the work area can be done by dumper or by wheel barrow to simply, easily and quickly spread GEOCELL® to the required loose thickness by hand using rakes.

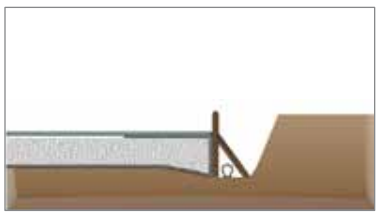


LEVEL GEOCELL®

For smaller sites, level GEOCELL® 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.

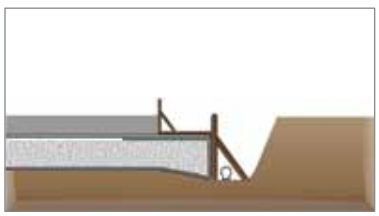
COMPACTION OF GEOCELL®

For small sites, compacting shall be performed by a lightweight vibrating shovel compactor (< 100 kg, frequency ~100Hz). Excessive compaction leads to increasing material consumption, but does not have a negative impact on the technical specifications. For design thickness greater than 300mm, placing and compaction is to be undertaken in two or three separate layers.



POLYETHYLENE SEPARATION LAYER

Wrap-up the edges of the geotextile to cover the GEOCELL® layer. Protect GEOCELL with overlapping PE-foil.



INSTALL FORMWORK FOR SLAB

Install formwork for the foundations slab directly on the finished GEOCELL surface and pour slab to meet static requirements

THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL® FOAM GLASS GRAVEL

INSTALLATION AND COMPACTION

Compaction Factor 1.3:1
Light vibration plate with strong drive
Running weight<100 kg
Frequency> 85 Hz, centrifugal force <18 kN

Compaction Factor 1.3:1
Medium-weight, non-propelled and self-propelled rollers
Running weight <7.5t, static line loads ~ 20 kg / cm
Frequency> 65 Hz

Compaction Factor 1.6:1
Medium vibration disk with strong propulsion
Running weight <500 kg
Frequency> 65 Hz, centrifugal force 18 kN <60 kN

Compaction Factor 1.6:1
Vibrating roller with 2500 kg operating weight

Compaction Factor 1.6:1
Stamping device with adjustable force input

GEOCELL® FOAM GLASS GRAVEL

DELIVERY OPTIONS

FORMS OF DELIVERY FOR GEOCELL FOAM GLASS GRAVEL

BULK LOOSE MATERIAL - Max 90m³

Walking floor truck - 18m x 2.5m x 4m

Pre-packed bulk bags - Max 66m³

Walking floor truck - 18m x 2.5m x 4m

Pre-packed bulk bags - 20m³ per load

Crane off load - local delivery only

Pre-packed bulk bags - Qty as required

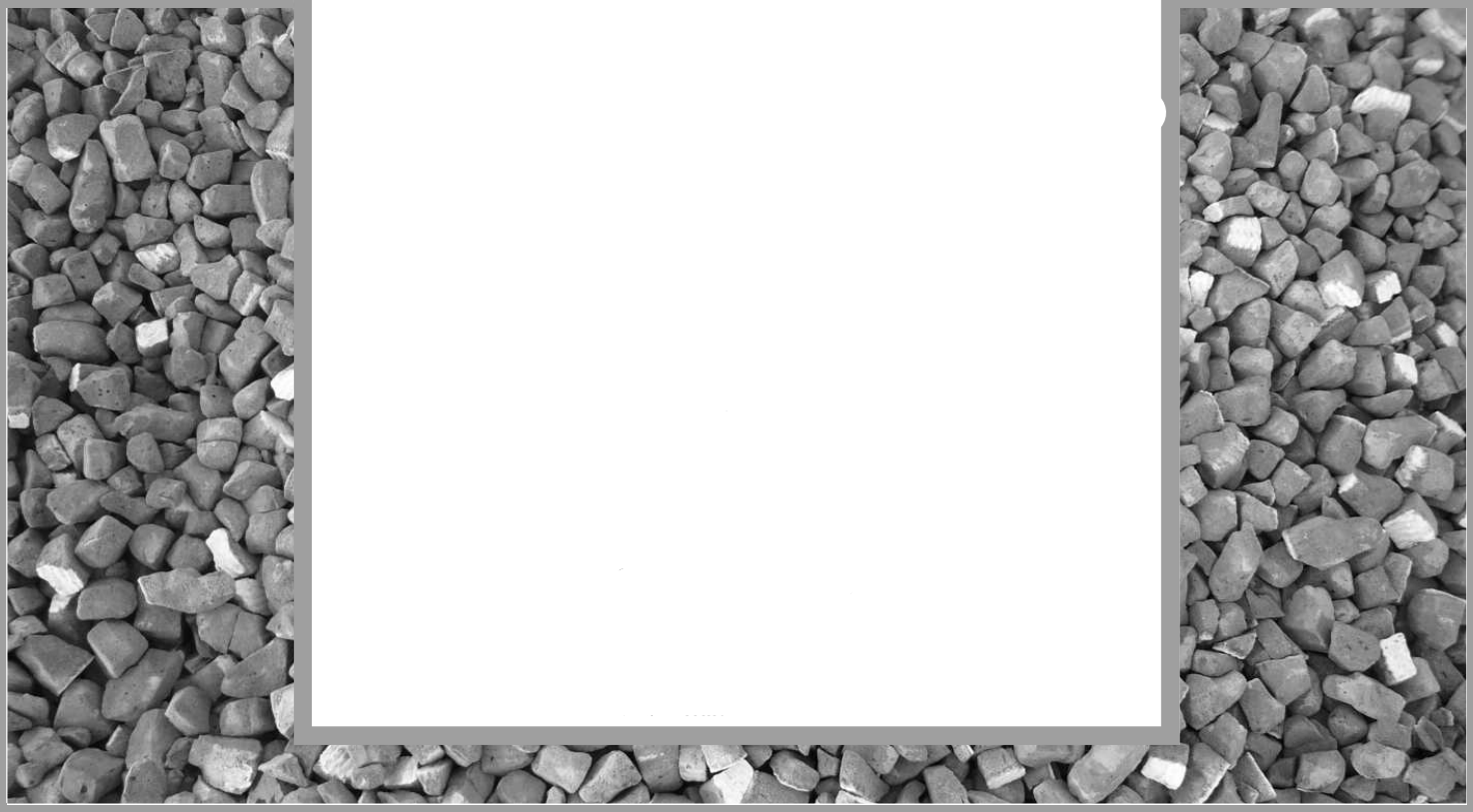
Pallet distribution network

Bulk bags Sizes
1 m³ ~ 150 kg
2 m³ ~ 300 kg

THE ECOLOGICAL ALTERNATIVE FOR ALL FOUNDATIONS

GEOCELL

FOAM GLASS GRAVEL



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