ENERGOCELL® FOAM GLASS GRANULES INDUSTRIAL INSTALLATION GUIDE

The potential of foam glass granules can be best exploited in use by proper installation. In order to achieve a lasting construction, follow exactly the steps described in this guide.

ATTENTION: During the spreading of the foam glass granules dust may be formed in the air, and workers should wear dust masks the whole time, to prevent dust inhalation.

1. Ground preparation:

IMPORTANT: Energocell® foam glass granules cannot be used in ground water, capillary zones immediately above ground water, and in groundwater pressure affected soils. The building pit shall be prepared as specified in the construction plans. As a next step the infrastructure for service installations is placed.

1: *ground preparation with rubber-tracked machine*

2. Geotextile fabric laying process

Installation of a geotextile fabric that weighs at least 200g/m^2 is recommended, with at least 20-cm side-to-side overlaps, and an edge for overlap – eventually for folding back – correspondig to the foam glass that extends beyond the building area (e. g. to separate the fine fractions under the pavement or paving stones).

3. Transportation

For industrial hall constructions the material is typically delivered in bulk. Transportation with a moving-floor truck of 90m^3 is the most cost-effcient method, it unloads the material from the back, while moving forward.

Image 2: unloading from a moving floor truck (Debrecen, Hungaropharma storage hall)

Rear-tipper vehicles of 60 and 80 m^3 are also a means of cost-efficient transportation. This transportation method is conditioned by the existence of a flat and open area or a hall of adequate height.

Image 3: unloading from a 60 m3 rear-tipper truck (Nagykereki, M4 highway)

When there is not enough space for trucks on the construction site, the material can be delivered in 3-m^3 big bags. In this case the developer needs to organize the unloading of the bags from the truck. The bags have discharge spouts on the bottom, through which the material can be spread very fast, from the bags hung over the incorporation area.

Image 4: machine-tool factory production hall

2: fast spreading through the discharge spout

4. The Energocell® layer structure

The compact foam glass layer structure is built in three phases: the spreading, the levelling, and the compacting of the material. This three-step process can be repeated as needed, until the layer thickness required by the construction plan is achieved.

A. The spreading of the foam glass

The Energocell® layer is ideally spread by an excavator, but depending on the circumstances of the construction, a front-end loader or a bulldozer can also be used. To avoid foam glass breakage during spreading, **circulation on the surface should be avoided whenever possible**.

4: spreading by excavator (Ócsa, Bio-Fungi plant)

3: direction of movement of the excavator during spreading

B. The lecelling out of the layer

The loose granule layer needs to be levelled until an adequately flat surface is achieved. The easiest way to carry this out is raking over it, but on large surfaces the use of a rubber-tracked machine is recommended. In order to obtain a levelled surface, a levelling instrument should be used.

C. Compaction:

The Energocell® foam glass granules can be compacted with a vibratory plate (75–150 kg) or a vibratory roller (on larger surfaces). Compaction – as part of the three-step process – needs to be carried out according to the final layer thickness, on one ore more layers.

Compaction rate:

- General load capacity floors: 1:1.3 (compactness of 30%)
- Industrial floors: 1:1.4 (compactness of 40%)

Compaction tools

- Vibratory plate: (75-150 kg)
  - for achieving a 1:1.3 rate
  - max. 20 cm thickness per layer
  - 2 to 4 passes

5: incorporation with vibratory plate

- Footpath roller (2-4 tonne):
  - 1 for achieving a 1:1.3 rate
  - max. 25 cm thickness per layer
  - Incorporation:
    - 1 x back and forth smoothing pass
    - 2 x vibratory back and smoothing forth passes
  - for achieving a 1:1.4 rate
  - max. 25 cm thickness per layer
  - Incorporation:
    - 1 x back and forth smoothing pass
    - 2 x vibratory back and smoothing forth passes
    - 1 x back and forth smoothing pass

6: incorporation with a 3-tonne footpath roller

- <u>Road roller: (6-12 tonne)</u>
  - for achieving a 1:1.4 rate
  - max. 35 cm thickness per layer
  - Incorporation:
    - 1 x back and forth smoothing pass
    - 2 x vibratory back and smoothing forth passes
    - 1 x back and forth smoothing pass

7: compaction with a 12-tonne vibratory roller (Debrecen, Hungaropharma storage hall)

The accurate number of roller passes needed in the case of a given equipment type, layer thickness, and subsoil can always be defined only by on-site test compaction.

5. Measuerement of the load capacity of the Energocell® layer

After compaction the Energocell® layer can be evaluated by plate load testing. The compression modulus of the Energocell® in itself is E_2=40-50 Mpa depending on the compaction rate.

As set out in the current standard, on the compacted Energocell® layer a 2-cm load distributing layer of 0-4 fines needs to be spread, because the granule particles may be loosened by compaction, and this can lead to inaccurate measuerement results.

We know from experience that on the days following compaction higher E_2 values are measured due to settlement.

8: standard fine fractions spread under the loading plate