

Foamed cement

1. Introduction

Foamed cement normally has a density of between 400 and 1 600 kg/m³ (compared with about 2 300 kg/m³ for ordinary concrete). It is made of a cementitious material, a filler or aggregate, and an aerated foam. It is also known as cellular, lightweight or gas concrete.

This leaflet discusses materials for foamed cement, how it is manufactured, its properties and typical applications.

2. Materials

The cementitious material can be:

- Cement complying with SABS ENV 197-1; strength class 32,5 or higher
- High-alumina cement
- Blends of either of the above with fly ash or ground granulated blastfurnace slag

The filler is usually a fine sand or fly ash with 85 to 100% passing the 4,75-mm sieve but nothing passing the 75- μ m sieve.

The aerated foam is made by mechanically agitating a foaming agent, either hydrolysed protein or a synthetic chemical. Water is used to dilute the foaming agent; the ratio of water to agent is normally 40:1 for protein or 25:1 for synthetic chemicals. Air-entraining admixtures may also be used, at dosages between 0,4 and 0,7% by mass of cement.

3. Manufacture

The normal procedure for the production of foamed cement is as follows:

1. Specify density.
2. Determine the mortar mix ratio using the rule-of-thumb:
 - Density <1 000 kg/m³, sand:cement = 1:1
 - Density >1 000 kg/m³, sand:cement = 2:1
3. Determine the volumes of mortar and prefoam required such that when the foam is added the correct volume will be obtained. (Information is available from suppliers, see section 6.)
4. Dilute the foaming agent as directed by the supplier.

5. Check that the foaming machine settings are set to deliver the correct volume and density of foam.
6. Discharge the foam into the mixer containing the mortar.
7. After mixing, measure the fresh wet density and compare with specified requirement.
8. Adjust the density if necessary by modifying the ratio of mortar to foam.
9. Place foamed cement as required.

4. Properties

- Self-compacting and free flowing
- Pumpable and thus easy to place in inaccessible places
- Good thermal insulation
- Good acoustic damping
- Frost resistant
- Wide range of possible densities
- Strength ranges between 1 and 10 MPa depending on density
(Foamed cement is therefore too weak for direct exposure to traffic and hail and should be protected, eg by means of a bonded sand-cement screed or bonded or separate concrete topping of thickness appropriate to the service conditions.)

5. Typical applications

- Filling disused basements and old petrol and gas tanks
- Backfilling embankments to reduce lateral loads on abutments
- Trench filling for reinstatement of roads
- Filling underground workings to prevent rock-falls and accumulation of methane
- Thermal insulation
- Acoustic damping
- Level corrections

6. Suppliers of foamed concrete or materials for foamed concrete

ABE Construction Chemicals

PO Box 5100, Boksburg North, 1461

Tel: (011) 917-2520

Fax: (011) 917-6788

Cellucon CC

52 Kilkenny Road, Parkview, 2193

Tel/Fax: (011) 646-8325

Foam Technology

PO Box 713, Bramley, 2018

Tel/Fax: (011) 786-8843

Foamcem SA

PO Box 33330, Jeppestown, 2043

Tel: (011) 614-1164

Fax: (011) 614-1160

Foamtech

PO Box 4173, Brits, 0250

Tel: (012) 250-2052

Fax: (012) 250-2038

Fosroc Stratabolt

PO Box 52, Isando, 1600

Tel: (011) 923-1900

Fax: (011) 923-1935

Cement & Concrete Institute

PO Box 168, Halfway House, 1685

Portland Park, Old Pretoria Road, Halfway House, Midrand

Tel (011) 315-0300 • Fax (011) 315-0584

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