



# CEMENTOL® PENILO 1

## *Foaming agent for producing foamed - cellular concrete*

### FIELD OF APPLICATION

**Cementol Penilo 1** is a special agent used to produce lightweight foamed - cellular concrete. Foamed concrete is an excellent building material because it is lightweight, which means reduced loading of the supporting construction. Large volume is obtained with less material thanks to fine and stable foam prepared with **Cementol Penilo 1**.

Because of its properties **Cementol Penilo 1** is used for:

- Cellular concrete for thermal insulation:  
Concrete with volume mass up to 1000 kg/m<sup>3</sup>. Limited use: mostly for insulation fillers and as an insulation grout for pillars and hot-water systems.
- Construction concrete for thermal insulation:  
Concrete with volume mass from 1000 to 1500 kg/m<sup>3</sup>. Concrete of this type can be used for various purposes:  
as mortar: building and plastering, thermal insulation for floors and roofs;  
for supporting constructions and concrete elements with compressive strength up to 20 MPa: fire barrier walls, facades, precast concrete, building blocks, small-size concreting etc.
- Supporting cellular concrete:  
Concrete with volume mass over 1500 kg/m<sup>3</sup> - mostly used as construction concrete with compressive strength up to 30 MPa: precasting large-size supporting facade elements, prefabricated pillar walls, staircase rails etc. On building sites it is used for grouting panels, pillars, frames, walls etc.

### CHARACTERISTICS

	Property
Appearance	Colourless or lightly coloured liquid
Density, 20°C	1,016 - 1,021 kg/dm <sup>3</sup>
pH	6 - 7

### PROPERTIES OF FOAMED CONCRETE

- Light weight.
- Soft plastic to liquid consistency.
- Defined volume mass.
- Pumpable.
- Non-flammable.
- Easily placeable by tube, pump or chute.
- Guaranteed strength.
- Good thermal insulation.
- Economical.



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### ADVANTAGES OF FOAMED CONCRETE

#### Foamed concrete

- Saves workforce: 1 - 2 workers less are required
- Great capacity of placeability
- Reduces the quantity of sand by 300 - 1200 kg/m<sup>3</sup>
- Reduced noise pollution
- Removed with a pick
- Rational consumption of means of transport

#### Ordinary concrete

- More workers are required
- Lower capacity of placeability + use of vibrator
- High raw material consumption: 2000 kg of sand/m<sup>3</sup>
- Noise pollution
- Removed with a compressor
- High costs of transportation

### RAW MATERIAL FOR FOAMED CONCRETE PREPARATION

#### Mineral aggregate

- It is possible to use all types of natural and ground mineral aggregates.
- For foamed concrete with densities 400 - 800 kg/m<sup>3</sup>, aggregate of max. grain size 2 mm should be used.
- For foamed concrete with higher densities, aggregate of max. grain size 8 mm should be used.

#### Cement

- All types of cement can be used.
- However, we recommend the use of higher-quality cements.

#### Chemical admixtures

- In general all types of chemical admixtures for concrete may be used, depending on specific requirements,
- Trial mixes for each specific use are recommended.

#### Cementol Penilo 1

- Foam weight should be between 60 and 70 g/dm<sup>3</sup>.
- **Cementol Penilo 1** is diluted with water in proportions between 1:20 and 1:30.
- The use of **Cementol Penilo 1** for the following volume masses of cellular concrete:
 

800 kg/m <sup>3</sup>	ca. 1,3 l/m <sup>3</sup>
1200 kg/m <sup>3</sup>	ca. 1,0 l/m <sup>3</sup>
1800 kg/m <sup>3</sup>	ca. 0,5 l/m <sup>3</sup>

### CELLULAR CONCRETE PREPARATION

#### PREPARING THE FOAM

Foam is prepared with a stable foam generator or foam-gun (this gives a lower-quality foam, so a larger quantity of it will be needed).

#### MAKING CELLULAR CONCRETE

After mixing the basic components, add foam. The quantity of foam depends on the required volume mass of cellular concrete. After having added the foam, concrete has to be mixed for another 30 seconds or until a homogenous mixture is obtained. Foam can also be added into an automatic concrete mixer directly on building site. Cellular concrete of all consistency (workability) levels can be prepared. No vibrating is needed for placing, except by larger volume masses and harder consistency. In such cases "shock" vibrating or lighter vibrators have to be used. With the quantity of foam, cellular concrete density and therefore thermal insulation properties are regulated: the lower the density, the lower the thermal conductivity of concrete. By choosing lower density, good thermal insulation can be achieved, whereas higher density results in higher strength of cellular concrete.

### TECHNICAL PROPERTIES OF CELLULAR CONCRETE

#### Fresh concrete

- Cement content: 280 - 390 kg/m<sup>3</sup>
- Aggregate content: 260 - 1300 kg/m<sup>3</sup>
- Foam content: 710 - 220 l/m<sup>3</sup>
- **Cementol Penilo 1** content: 1,35 - 0,35 l/m<sup>3</sup>
- Water content: 100 - 140 l/m<sup>3</sup>

#### Hardened concrete

- Compressive strength - 7 days: 0,9 - 8,4 MPa
  - Compressive strength - 28 days: 1,5 - 18,0 MPa
  - Compressive strength - 90 days: 3,0 - 20,0 MPa
  - Bending strength - 28 days: 0,2 - 1,5 MPa
  - Water absorption: 35 - 25 vol %
  - Water absorption: 40 - 15 ut %
  - Thermal conductivity coefficient: 0,23 - 0,63 W/mK
  - Resistance to freezing: 20 - 0
- (reduction of the E module after 200 freeze-thaw cycles)

### PACKING

- 10 kg and 50 kg plastic cans.

### STORAGE

- Store the product in tightly closed packaging at temperatures between +5°C and +35°C. Protect from damage, freezing and direct sunlight.
- In tightly closed and undamaged packaging, the shelf life of the product is min. 2 years from the production date.
- The product may still be used after the date of expiry, but the characteristics important for the intended use have to be examined.

### SAFETY PRECAUTIONS

- General instructions for working with chemicals should be observed when working with **Cementol Penilo 1**:
- Eating, drinking or smoking during work is prohibited.
  - After finishing work, hands should be thoroughly washed with water.

### NOTE

Instructions are given on the basis of examinations and technical experience of the firm. Due to specific conditions and work methods, preliminary tests are advised for every type of use. Since we cannot influence the course of work, we cannot be held responsible for its quality.