



lightweight **CLC** cellular concrete

- using sand, cement, water and foam only
- for structural (reinforced) and non-structural application
- produced as prefab or cast in-situ
- easily to be integrated into existing concrete and prefab plants at little investment and without major changes in production to tradi-



Vertically cast panels for government agriculture schools in Middle East, density 1400 kg/m³

- tremendous weight reduction
- improved fire rating
- high thermal insulation
- easy application
- savings in rawmaterial, transport, crane-cost and assembly

Cellular concrete for structural application

Since the introduction of cellular concrete systems to the construction industry more than 50 years ago, it had been almost exclusively limited to non-structural void filling jobs, roof insulation and at the best for blocks.



Preproduced „neopor“ foam

Insufficient physical properties caused by instable foams and lack of scientifically undertaken research work did not allow the use of such void-filling cellular concrete systems for structural application.

In developing „neopor“ foaming agent, equipment and concrete technology in joint-venture with a reknown manufacturer of chemicals, construction machinery builders and independent building research institutes, it was focussed on a reliable system to enable the construction industry to produce cellular concrete for structural, reinforced application.

With the introduction of the „neopor“ system more than 10 years ago it was for the first time possible to reproduce any desired density from 400 -1800 kg/m³ with a high accuracy and at an optimum density versus strength ratio.

Foaming agent

Our protein-hydrolisation based foaming agent warrants high stability of the foam, successfully withstanding the manifold forces occuring when mixing, conveying (pumpable), casting and during the hydration process.

„neopor“ foam causes no chemical reaction in the concrete but merely serves as wrapping material for the air entrapped.

Store-life of „neopor“ ist guaranteed to be at least 24 months when adhered to instructions.



Mobile „neopor“ unit

Qualified as concrete additive under the strict regulations prevailing in Germany, „neopor“ foaming agent is constantly subject to unannounced quality control by officials, ensuring that no components are used that might be harmful to concrete or reinforcement. (Chloride content of „neopor“ less than the allowed 0,002 %).

Note:

1 kg of „neopor-600“ foaming agent, diluted in 40 ltrs. of water yields approx. 540 ltrs. of foam.

Equipment

A full range of stationary and mobile equipment to produce and precisely dose the foam, a conveying system to feed sand and cement, and a mixer with highly effective horizontally operating screw and integrated concrete pump, all produced for „neopor“ by PUTZMEISTER, is available with either electric motor or diesel drive.

However, most traditional mixers and very successful truck mixers may be utilized to produce cellular concrete.

By installing a foam generator the „neopor“ system can readily be intergated into existing concrete or prefab plants, with little investment and maintaining production procedures used to.

Handling of cellular concrete

The total absence of gravel and the ball-bearing effect of the foam are responsible for the high consistency of cellular concrete. Thus vibration for compacting reasons is totally unnecessary, as the moulds, vertical or horizontal, are completely filled.



„neopor“ field plant in Singapore

Releasing agent

Proper releasing agents have a substantial influence on the surface of cellular concrete.

Curing of cellular concrete

Cellular concrete is generally air-cured. Curing might be accelerated by either applying heat, steam or chemicals. A curing compound prevents excessive loss of water after casting and consequently increases strength.

Demoulding of cast elements

Depending upon the outside temperature and upon the cement quality used, building elements of cellular concrete may be stripped 6 -10 hours after casting. As with traditional dense concrete curing on the yard or on the site should be facilitated by keeping the demoulded elements under moisture for a few days.

Ageing of cellular concrete

Using the same basic components as for dense concrete, namely sand, cement and water, and considering that „neopor“ foam has no chemical reaction in concrete besides serving as wrapping material for the airbubbles embedded, ageing of cellular concrete virtually carries on infinitely and as long as the cement used draws humidity from the air.

Multi-Applications

for structural and non-structural cellular concrete

Non structural thermal roof-insulation, void filling
in-situ or prefabricated

Structural cellular concrete produced by truck mixer
Industrial production of precast panels



Some physical properties of cellular concrete

Range of densities : 400-1800 kg/m³

Achievable strength : 1,0-25 N/mm² (10-250 kg/cm²)

Shrinkage behaviour : 1200 kg/m³-0,215 mm/m
dense concrete - 0,145 mm/m

Thermal conductivity : 0,082-0,555 (W/m K)
dense concrete - 2,1 (W/m K)

Fire rating : non combustible DIN 4164

Water absorption : approx. 5 % at a density
Of 1200 kg/m³ no condensation closed cellular structure

Detailed diagrams based on comprehensive tests and research work undertaken by independent building institutes are available.



5000 apartments in Nasr-City, Cairo

Major references of projects undertaken worldwide by „neopor“ customers

Tens of thousands of houses and apartments, but also schools, hospitals, industrial and commercial buildings have been constructed all over the world or are under progress using „neopor“ products and technology.

Some outstanding projects are:

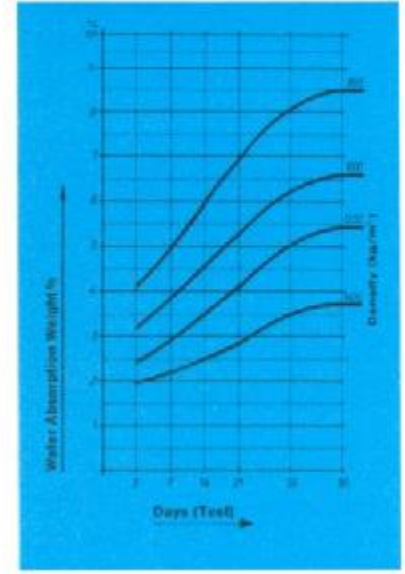
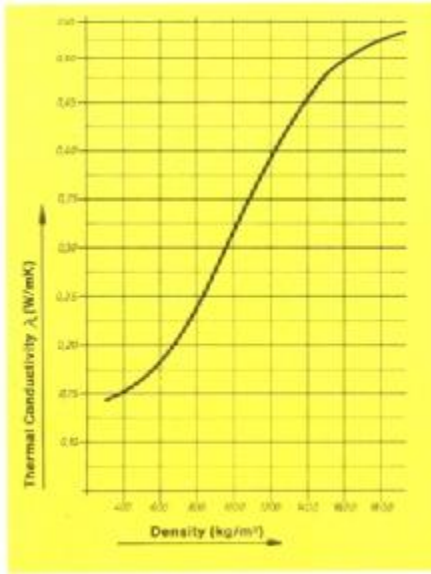
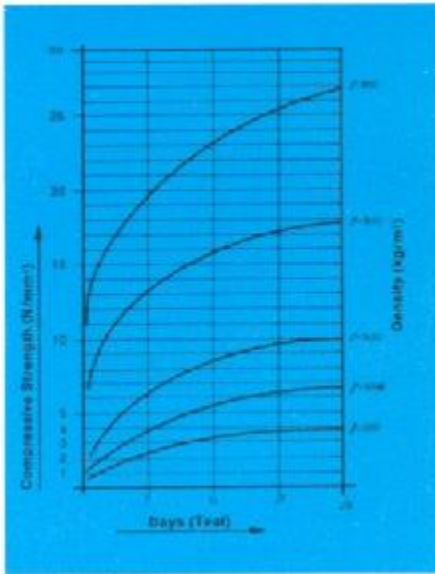
5000 apartments in Cairo/Egypt
10500 apartments in Singapore
7500 houses in Libya
10000 houses in Brasil
2100 villas in Medina

Services offered by „neopor“

Supply of equipment and chemicals
Provision of concrete-and civil engineers to teach local labour
Supply of complete mobile or stationary prefab plants solely based on cellular concrete

3000 houses in Tunisia
1300 houses in Botswana
300 low cost houses in Nigeria
16 agricultural schools in Iraq
sewerage relining system in Kuwait
technical application in mining
industrial and commercial buildings

BASIC CHARACTERISTICS



COMPRESSIVE STRENGTH

- The strength shown was taken from laboratory cubes, and refers to oven-dry densities.
- High early strength can be achieved by rapid hardening cement.
- Increasing the quantities of sand and cement and decreasing the amount of foam yield higher densities and consequently higher strength.
- Different qualities of sand and cement influence the strength of cellular concrete.
- Combining expanded clay and other lightweight aggregates lead to an even better strength versus density

Recommended mix design for cellular concrete based on a mixing volume of 1 m³

THERMAL CONDUCTIVITY (DIN 52612)

The thermal conductivity as shown by the diagram depends upon the density of the concrete. For structural elements we recommend a density between 1000-1600 kg/m³ (62-100 pcf).

WATER ABSORPTION AND FROST RESISTANCE

Tests were undertaken according to DIN 1048 (waterabsorption) and DIN 4226 (frost resistance). No visible damage was observed on the cubes after the tests, and the initial weight of the cubes was maintained throughout the test.

RESISTANCE TO CORROSION

Slabs were produced for tests in densities between 1000-1400 kg/m³. The non-protected reinforcement is to be covered with 25 mm of cellular concrete. After 4 months tests there was no corrosion on the 1200 kg/m³ specimen.

SAND GRADING (DIN 1045)

A minimum of 20 -25 % fine sand (less than 0,25 mm) is recommended for better physical properties.

SHRINKAGE

A wall panel in density 1200 kg/m³ (75 pcf) for example, cured in open air, after 28 days showed a shrinkage of 0.215 mm/m (shrinkage of dense concrete, 250 kg/cm²= 0,145 mm). Between the 28th and 90th day the shrinkage was even less than with traditional concrete. Shrinkage can be further reduced when using fiber to

Density in kg/m ³ (pcf)		400(25) weight (kg) volume (ltr.)		800(50) weight (kg) volume (ltr.)		1200 (75) weight (kg) volume (ltr.)		1600 (100) weight (kg) volume (ltr.)	
Sand	kg	-	-	420	160	780	297	1130	430
Cement	kg	30	97	320	103	360	116	400	129
Water	ltr.	11	110	120	120	140	140	160	160
Neopo foaming agent	kg		1,5		1,2		0,9		0,6
Foam by volume	ltr.	-	800	-	630	-	460	-	290
Water in foam	ltr.	60	-	46	-	35	-	21	-
Wet concrete		470	kg 1007 ltr.	906	kg 1013 ltr.	1315	kg 1013 ltr.	1711	kg 1009 ltr.

For further detailed information apply directly to:

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