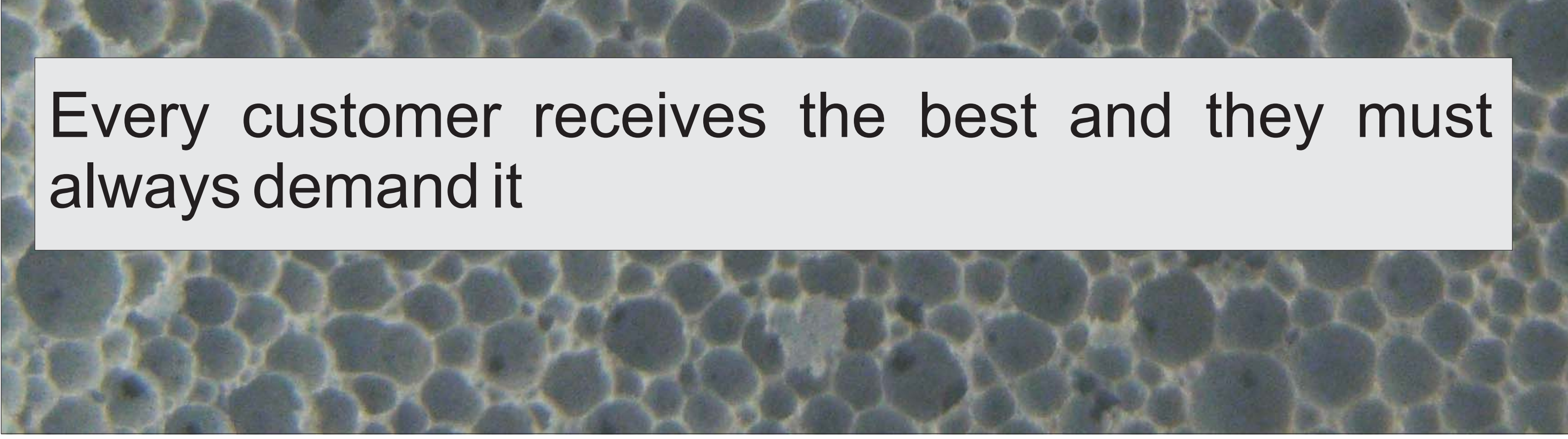
DOSIFICADORES®
garcía fernández

Equipment for the manufacture
of technical cellular concrete.

CELLULAR CONCRETES



Every customer receives the best and they must always demand it

The Cellular Concrete made “in situ” is a material widely used in construction that we define as a grout of water, cement, air and chemical additive. It is made on site, where it is then pumped and spread. There are many applications and therefore the physical characteristics of the different C.C. can change.

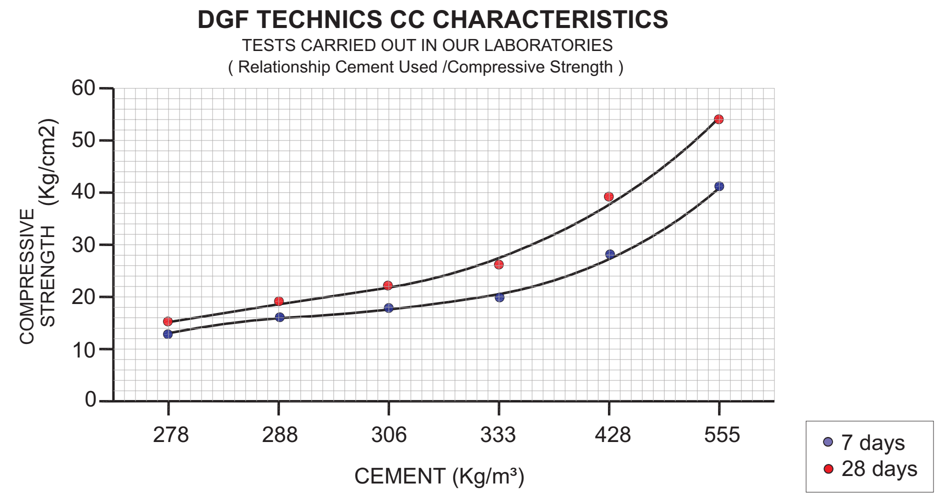
When we added the “Technical” term to that of the C.C., we were specifically referring to C.C. made with the AG-300/60 R equipment plus the appropriate garcía fernández® trade name foaming chemical additive for application to be carried out.

The application of the work performed with these two components: machine + foamer conforms to a unique method in the market that has been called the DGF METHOD.

With this method we basically obtain:

- A complete equipment, the AG-300/60 R that makes an uniform mixture at a high performance and the system of continuous pumping.

- Chemical additives that provide an identical, stable bubble which is capable of supporting the weight of the cement and not allowing it to precipitate to the bottom.



Study carried out with Cement Portland CEM II/ B-L 32.5N							
	Density (Kg/m³)			Resistance of a thickness of 10 cm to		
Name	Moist	Dry	Cement Kg/m³	Compression (Kg/cm²)	Thermal Insulation (°Cm²/w)	Acoustic Insulation dB(A)
HC 250	400	344	250	14	1,11	27,50
HC 300	500	430	300	22	0,81	29,11
HC 350	663	570	350	28	0,62	31,14
HC 400	758	650	400	37	<0,62	32,00
						Acoustic Insulation NBE-CA-88

Cellular concrete is a material which consists of a solid cement matrix that contains lots of small air bubbles in its interior. The particles of solid cement matrix that contains lots of small air bubbles in its interior. The particles of solid material are bonded to each other by a large adhesive effect that produces a deformation on the sphere, in the contact surface between them. When a cross-sectional section of the material is observed using a magnifying lens (photos 1 and 2), a similar appearance to a bees honeycomb can be seen. This arrangement reduces cement consumption to a minimum, because the content of solid material is very small, as in nature where bees use a minimum amount of wax.

The unit form a three-dimensional reticular structure. This structural geometry contributes to the high compressive strength of C.C.
From the thermal point of view, heat transmission through C.C. is much reduced, due the presence of a multitude of small and very fine reticules of hardening cement. This contains air enclosed in bubbles with a volume as sufficiently small as heat transmission not to take place via convection. Thus, the transmission of heat through them has to take place via conduction, and considering that air is a powerful thermal insulator, this means that, for heat to pass through cellular concrete, it must travel through a very long and complex path via the solid matrix.

In addition, cellular concrete is a good acoustic insulator, due to the transmission of sound is joined to the transmission of pressure waves through the material.

In C.C., sound waves lose energy whenever they cross an air cell. Therefore, the material behaves like an enormous absorbent sound blanket.
So that these three fundamental properties: Compressive strength, sound and thermal insulation are good, it is necessary for the bubbles to be very small and uniform. In turn, this is a direct consequence of the tensioactive properties of the chemical additive with which the cellular concrete is made. Thus, the use of a good additive prevents the precipitation of the cement once it is laid and until it is forged.

If, on the other hand the additive is of poor quality, and does not fulfil the minimum specifications necessary, in other words, the tensioactive properties are not adequate, large bubbles will form which break to form a cement conglomerate with large air occlusions. This results in them losing their good compressive strength and acoustic/thermal insulation properties (photo 3).
The first consequence of the above is that the cement precipitates, resulting in a heterogeneous concrete of variable density and discontinuous properties between the surface and the bottom. In other words, there will be a large amount of cement at the bottom and little on the surface, which always results in an undesirable product: very hard in the layers at the bottom and fragile on the surface. In addition, it results in a high consumption of cement.
Due to this mixture of excellent characteristics, it is a material recommended by all architects and is increasingly included in construction specifications for new work projects and those of renovation.

QUALITY CONTROL

By only weighing the CC, we can check the moist working density and with the tables provided can read off the rest of the properties (compressive strength, sound and thermal insulation, etc).

Figure 1

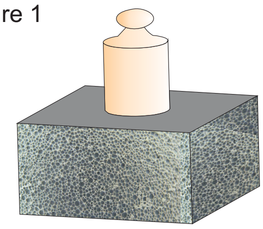


Figure 1. Graphical representation of the behaviour of a technical CC. Excellent compressive strength, low cement cost. Air occlusion in uniform bubbles and with reticular structure of homogeneous geometry throughout the whole section. Excellent thermal and acoustic insulation properties.

Figure 2

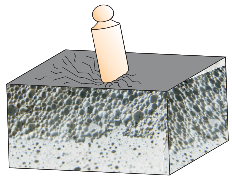
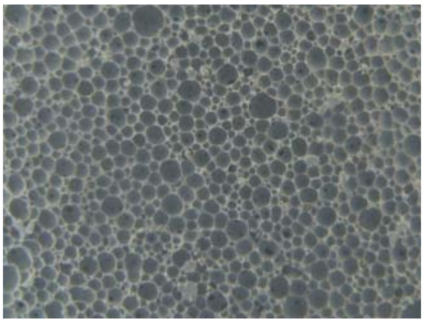


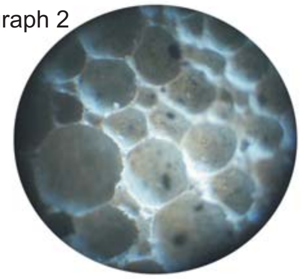
Figure 2. Graphical representation of the behaviour of a poor quality CC. Mixing with inadequate machinery and a chemical additive of poor tensioactive properties causes a precarious compressive strength, with a fragile superficial layer, air occlusions in bubbles which are broken forming a cement conglomerate with large holes. Heterogeneous section and with high cement cost. No insulation properties.

Photograph 1



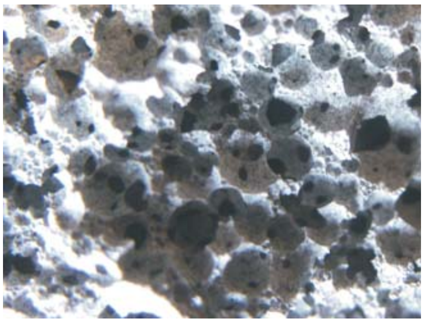
Cut section of technical cellular concrete sample (CC 250). Photograph at 5 times magnification.

Photograph 2



View of sample CC 250. Photograph at 30 times magnification. View of the complete bubble.

Photograph 3



View of CC sample of poor quality. 40 % of the bubbles are broken, deformed and of varying sizes.

AG-1
Average
Consumption
1 l/m^3.

SAN-5
Average
Consumption
1,5 l/m^3.

CHEMICAL ADDITIVES FOR PERFORMING TECHNICAL C.C.

All our additives are classified, packaged and labelled according to applicable EC directives. They are subjected to different quality controls during the complete process of manufacture, packaging and storage.
Everything we manufacture is laboratory tested to ensure the formulations are homogeneous, clean and free of impurities, with the appropriate degree of foaming ideal that they will produce top quality technical CC with closed, well-formed bubbles, and be homogenous throughout the grout.

We also test physical properties of the CC using laboratory test pieces to certify that our clients are going to obtain the required characteristics: Compressive strength, Acoustic and Thermal Conductivities, Ageing, etc. Each pallet is accompanied by its corresponding Technical Card and Safety Sheet.

1

2

3

FORMING SLOPES IN ROOFING

1. CC 250 in the roofing. An expansion gap of low density polystyrene has been placed between the partitions.

2. Another piece of work carried out with CC 250 in the covering and with slopes. It is advisable to use low density polystyrene in all the perimeters as expansion gaps.

3. A finished piece of work. It was carried out at high performance, with several workers spreading the pumped cellular concrete type CC 225. The process of placing the impermeable layer can be seen in the photo on the concrete with a geotextile intermediate.

4

5

6

STREETS AND SQUARES OUTDOOR APPLICATIONS

4. A job with CC 300 in squares and streets. The finished and levelled C.C. can be seen in this photo at its height. The surface receiving pressed concrete. The cement mixing lorry is seen manoeuvring on the finished concrete. In these applications, this close-up may seem striking to the layman, above all bearing in mind that the wheels are not in the least bit marked.

5. Buried pipes of large diameter with C.C. in a side street of previous square. The height varies between 40-80 cm, underneath the streets and square is a parking area.

6. A view of the finished work passable by pedestrians and road traffic.

All applications of Cellular Concrete

C.C. AUTOLEVELLING IN BUILDING INTERIORS

7 When using the chemical SAN-5, pumping and spreading of the C.C. autolevelling is fast and simple. The finish is exceptional. The rest of the process is the same as that for the AG-1 additive. It is now ready for the final paving desired.

8 Tripods for levelling are situated throughout the zone to be filled with autolevelling C.C. This C.C. can be used as a covering for service piping: Electrification, drinking water, waste water, floor heating surfaces, etc.

9 Autolevelling application of C.C. over large surfaces. The partitions are used as guides for the required level.

7

8

9

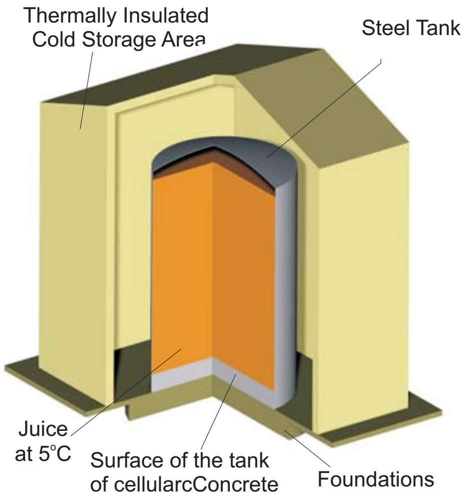
SPECIAL APPLICATION: TEMPERATURE INSULATION FOR LARGE TANKS

10 The end of the work and finish of the interior of one of the tanks in a fruit juice factory. The tanks are made of steel, each with a capacity of 4.000 m^3 and there are 6 of them in the interior of refrigerated premises set at 5 °C. The only location where there is a thermal bridge is at the bottom, in the foundations. To insulate it, a thermal insulation of HC 250 is pumped in an area 1 metre thick. Once finished and dry, it receives a welded and hermetically sealed steel covering throughout the whole of the tank perimeter.

11 The process is performed at high performance: 25 m^3/h, so the bags of cement are piled close to the mixer to supply it easily and quickly.

12 An outer view of the tanks in construction before being covered in the refrigerated area.

10



11

12