Green Building
New Smart Materials

Cellular Ceramics

Javier Diaz - Hong Kong, February 2020

The ecological construction model in Asia is taking very important steps at the level of legislation and consequently the effort of the sector is focused on the use of procedures and materials that reduce the environmental impact of the building works.

Digital applications to generate, process and update all the information related to the construction of an asset are a reality (BIM) and it is now the moment in which the use of new materials in industrialized setting will define much of the progress that we will achieve in the coming years.

There are many open fronts that are strictly technological, electromechanical exoskeletons, autonomous robots, etc., but we also have to have a significant number of new materials that have the potential to unleash a radical transformation in the way of industrializing finishes in new buildings, with the objective of improving costs, safety, increasing the speed of execution, reducing space, logistics and pollution around the construction site.

Ceramic foam and metallic foam are materials that have been used for many years in aeronautical and military applications, where the functional degree of the product is decisive so that a space vehicle does not disintegrate in atmospheric re-entry or a tank resists a mortar explosion. The application as a construction material is limited due to the price of the product and its availability, this is something that will change in the short term given the large investment that is being made in the Dawudian area (Inner Mongolia), where there is gigantic industrial park dedicated to processing the products derived from the

extraction of graphite and the recycling of the mineral waste produced in the purification processes. Currently there is already a large-scale industrial venture that has started up a factory with the capacity to producing 12 million m3 of cellular ceramic blocks and with a view to expanding the production to 160 million m3 in 2025.

The plates that are made of this material have certainly impressive characteristics, especially with regards of fire resistance, thermal and sound insulation, it is also a strong and rigid material but sufficiently malleable so that it can be processed with conventional tools such as drills for boring walls and cutting discs. At the same time, it has good compatibility with normal bonding products such as tile adhesives and can be easily painted with common emulsions.

In short, these are the basic features of lightweight cellular ceramics:

1- HIGH RESISTANCE. - compressive strength 7Mpa.

2- SOUNDNESS. - 38db in the 80mm thickness.

3- IMPACT RESISTANCE - given the great distribution of internal stresses> 1000N

4- ANTI-HUMIDITY - water absorption below 0.1%

5- LOW THERMAL CONDUCTIVITY - 0.05-0.085 w / mk

6- ANTI-FIRE - Level A1

7- LIGHT WEIGHT - 150-280 Kg / m3 for the insulating plates and 400-600 Kg / m3 for the base panels and prefabricated walls.

8- ANTISISMIC - low deformation, redistributes the trajectory of cracks, does not degrade in saline or alkaline environments, does not suffer from corrosion.

9- HEALTHY - it does not generate waste or toxic dust; it does not require special precautions to be installed or when it is disposed of. The product is not radioactive and does not give off any odor.

10- ECOLOGICAL - made 100% with recycled raw material and produced with renewable energy.

11- ECONOMICAL - Prefabrication with ceramic foam increases the transparency and accuracy of the cost estimate, speeds up delivery, guarantees the quality of the finish and the safety of the project.

To understand the projection of this new material, just look at the tables below, in which the technical characteristics of cellular ceramics are compared with other materials:

Test	Aerated Cellular Concrete	Fired perforated Brick	Cellular Ceramic
Density (Kg/m3)	600	1300	200-500
Compressive Strength (Mpa)	3.5	10	6.0
Thermal Conductivity Coef. (W/m.k)	0.22	0.45	0.05
Thermal Storage Coef. (W/m2.k)	3.59	6.6	1.6
Water Absorption (%)	30-50	11	0.1
Sound Insulation (db)	38	46	50
Wall/panel Thickness (cm)	18	24	8-20

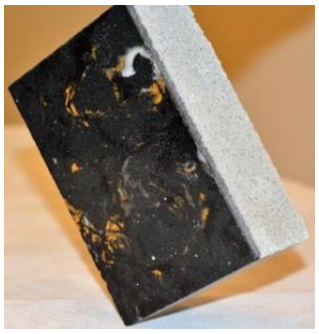
Test	EPS panel	Panel Mineral Wool	Cellular Ceramic
Density (Kg/m3)	18-22	120-180	200-500
Compressive Strength (Mpa)	0.1	0.15	6.0
Thermal Conductivity Coef. (W/m.k)	0.043	0.04-0.05	0.05
Tensile Strength (Mpa)	0.1	0.15	0.3
Deformation	Easy	Easy	Dificult
Sound Insulation (db)	38	46	50
Fireproof Level	B1-B2	A1	A1

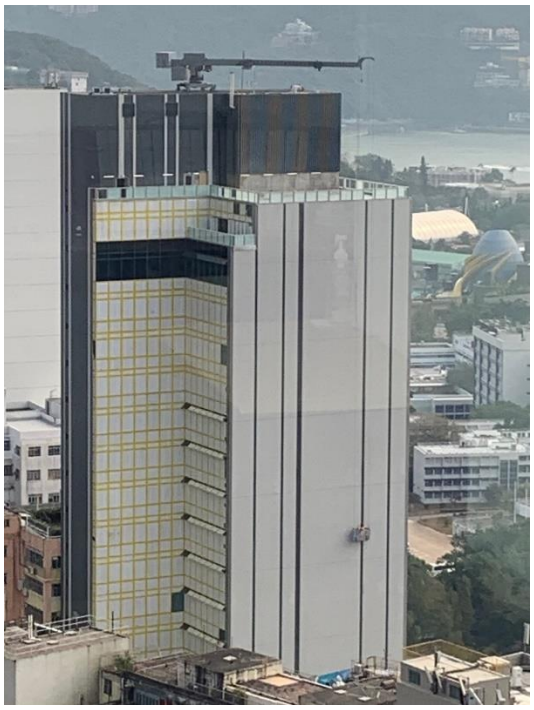


According to these data, it is very apparent that this material, used, for example, in an industrial environment to prefabricate bathrooms and kitchens, opens up new possibilities of application, aesthetics and savings. The panel is the only layer necessary to make the base of the precast, so it expands the useful surface of the space where it is installed and also increases all technical and safety features. Another fundamental point to take into account is the degree of durability of the product, apart from other very interesting parameters, it is enough to realize that being made of inert minerals and having practically zero water absorption, the useful life of the material It is extremely long, does not mold or rot and is suitable for use in all types of climates and even in extreme conditions of cold, heat, humidity, etc. In this sense, the durability is equal to that of the building in which it is used or that of the "skin" that is applied to achieve the desired aesthetic finish, so we immediately notice a very interesting synergy with porcelain products and in a special way with the large-format, thin-thickness tiles that are becoming so fashionable.

Another interesting application of cellular ceramics in relation to porcelain slabs is their ability to be kiln at a high temperature (1250C) and to integrate both surfaces in a single panel, the two products remain permanently united without the need to apply any type of adhesive. Thought for the facades of buildings, this material can be industrialized to make a complete wall of only 3 components, cellular ceramics, porcelain slab and an installation system based on anchors and not on a complex profile structure, for this reason it is much cheaper to be manufactured, given that the edge of the wall is demarcated by the same material, to which a series of grooves are made to fit them together, leaving only the gap required by the expansion joint that is deemed convenient in each case. The system is easily installed on each level of the building with a crane in the same way as other common systems. In any case, this process is much faster than having a crew of qualified workers, setting walls and installing

coatings at the heights, with glues and grouts, raised in complex scaffolds in which the physical safety of people is not ideal.



The plates are manufactured in high density panels depending on whether they are used to make walls, ceilings, base for floors, base for prefabricated items, or in low density if they are wanted for insulating applications. The standard sizes available at the moment are panels of 1200x2400mm and 1500x3000mm, with thicknesses from 20mm to 100mm, it is also common to serve plates cut to order and the possibility of integrating the design and specifications in REVIT is very much appreciated in the AEC community.

Do not hesitate to contact us for more information.

CLASICO HOLDINGS LIMITED

ROOM 3306, 33/F, TOWER A. PACIFIC LINK TOWER – SOUTHMARK, 11 YIP HING ST. HONG KONG SAR.

TELEPHONE: 852-25466623 - EMAIL: javier@clasicoholdings.com WWW.CLASICOHOLDINGS.COM