Silicate-based lightweight building system

Our partner, a Hungarian SME has developed a new silicate-based lightweight building system. This innovative construction technology is the result of a long-lasting search and development meeting the requirements of the latest market trends and serves as a really simple and fast building procedure. The client is seeking for partners (governments/companies/investors) for knowhow purchase or joint ventures abroad.

Innovation of the technology

The technology can be defined as a silicate-based lightweight building system. The building blocks are already covered by the insulating material and serve as remaining formwork elements at concreting procedure. After the concreting the formed reinforced concrete tissue grid in the special elements becomes load-bearing. There is no need for applying any subsequent heat or sound insulation.

During the development we continuously tried to work out the simplest construction technologies. The primary components of the plaster or gypsum fiber sheet the weapons of which provide the fast solidification and subsequent hardening of the reinforced concrete of the inner wall surface texture, the outer layer of plaster makes up the final surface of the internal and external walls. The second component is mineral wool or silicate foam which is responsible for providing heat and soundproofing and ensures the fire resistance of the wall. The third is a fabric reinforced concrete grid which gives the system earthquake resistance and ensures rigid box-like wall and floor structure. In the improved version of the system new kinds of materials, for instance: silicate foam can appear that would only further increase the quality, reliability of the product.

The system is documented and presented in the reference houses and the gained experiences practically demonstrate when using this technology, economy results from the simplicity and speed of the technology as well as the rational use of raw materials. Furthermore the maintenance of the completed buildings can be extremely beneficial. Remarkable feature is that the building blocks can be produced both on manual and machine-made lines. Any size of residential home can easily be created by learning the use of technology of module elements, either the owner building it himself or in bee system under the direction of a responsible technical leader; the system serves as a cost-effective solution for the creation of a home or other community buildings. The formwork elements can be applied not only as building block of the system but independently as subsequent fire-protective, heat-insulating walls. The building structure compared to traditional monolithic structure is significantly lighter and stronger.
Specifications

The main components of the technology

- Plaster
- Gypsum fiber
- Rock wool
- Foam silicate
- Concrete

When producing these building elements and construction, there is no need for greater mechanization but live workforce and hand tools.

- Many of the wall thicknesses can be made from 200 mm to 400 mm structural wall.
- The 200 mm cross-section wall corresponds to the value of a traditional brick wall ($U = 0.387$) to be found in the current market.
- The 400-mm cross-section wall already reached the requirements of the "passive house" construction ($U = 0.134$)
- It is suitable for roof and extra-floor constructions or traditional renovation and modernization.
- Since the system is earthquake resistant, it is suitable for construction or the reconstruction in disaster or flood-prone areas.
- Thanks to its fast on-site construction, the installation of a structurally complete 100m² one-storey residential building is 10 working days.
- Multi-storey residential buildings can also be built (AWU permission for five levels).
- The system for flat roofs and sloping roofs (30% at a heeling angle) can be created but any conventional roof can also be used on it.

The system provides flexibility so the order of layers can easily be changed and they are properly adaptive to natural conditions anywhere in the world.
Main advantages

- Silicate-based lightweight construction does not contain any wood or organic material.
- "Breathing", vapor pressure equalization of wall and floor structure.
- Incombustible, fire-resistant exterior components.
- Sound-bridge- and heat-free, heat-sound-proof.
- Building block surfaces are partly ready.
- Environmentally friendly building.
- Rapid on-site installation, construction time of a 100 m² ready-storey residential building is 10 working days.
- Also suitable for new, modern ECO residential buildings.
- Cost- and material-saving.
- Manual labor construction and does not require other lifting machinery.
- Material cost of a structurally complete, 100 m² residential floor areas built in m² approaches the cost of traditional brick buildings, however, the construction time is extremely fast on-site so manpower labor cost is saved. Due to very good ventilation, the walls of the building dry almost immediately and thus it ensures favorable inclusion.

Potential applications

Our goal with our new building system is primarily to ensure an alternative technology for home builders on the already crowded world market offering tectonic materials for construction. Using the easy to install elements, such self-supporting storey and attics can be achieved which has not had any appropriate solution so far. Providing the technology and building blocks of residential buildings, we would like to create opportunity to their own investments for those who wish to build with lower incomes with their "DIY" method that proved to be very popular in the past.
In compliance with the rigorous requirements we offer our fire-resistant, easy to install wall modules for industrial buildings to construct boundary and partition structures.

Since the system is earthquake-resistant, it is extremely well suited for the reconstruction of disaster-stricken areas; furthermore it is also suitable for upgrading in traditional renovations. The basic materials are to be found anywhere in the world and thanks to the easy-to-carry tools this technology is applicable around the world.

APPLICATION

The goal with the new ISB® building system is primarily to ensure an alternative technology for home builders on the already crowded world market offering tectonic materials for construction.

Using the easy to install elements, such self-supporting storey and attics can be achieved which has not had any appropriate solution so far.

Providing the technology and ISB® building blocks of residential buildings, we would like to create opportunity to their own investments for those who wish to build with lower incomes with their “DIY” method that proved to be very popular in the past.

In compliance with the rigorous requirements we offer our fire-resistant, easy to install ISB® wall modules for industrial buildings to construct boundary and partition structures.
Since the system is earthquake-resistant, it is extremely well suited for the reconstruction of disaster-stricken areas; furthermore it is also suitable for upgrading in traditional renovations. The basic materials are to be found anywhere in the world and thanks to the easy-to-carry tools this technology is applicable around the world.

This technology has been further developed where we use building blocks made of mud with thousands of years of history as well as the ISB® elements produced from desert sand: they have expanded quartz-granules as additives.

The newest system was registered and patented under #P1200487 at the Hungarian Intellectual Property Office on 8/23/2012.
During the technological development our primary focus was to adapt the manufacturability of the ISB® building elements to any country in the world and to maximize the usage of the local commodities.

Therefore we developed a family of building blocks manufactured from desert sand that is suitable for construction of multi-level, earthquake resistant residential buildings that has the same fundamental characteristics as our monolith reinforced concrete grid system that has been proven and qualified in our previous structures.

Desert countries presently don’t utilize their sand, in fact, often they are forced to use imported materials for their constructions.

**Potential areas of use**

The technology primarily can be applied in the building industry: big government projects, catastrophe areas or in developing countries where human labor is very cheap.

**Intellectual property status**

The technology is protected by patent.

**Stage of development**

The technology has already been used on the Hungarian market. Also it should be mentioned that the present technology is an outcome of long developing process, started in the 1970’s. The earlier system was based on the same idea except the materials were different. This technology was used in Yemen, The United Arab Emirates and Egypt.
Type of collaboration

Our client is interested in selling the know-how of the technology to foreign countries, governments or bigger construction companies. They also consider to form joint ventures close to Europe or even establishing franchise.

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