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THE USE OF CERAMIC BLOCKS OF BRICK AS A COMPLEX MATERIAL IN THE EXECUTION OF A BUILDING

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Abstract

The purpose of this paper is to present and maintain that the use of bricks, by brick ceramic blocks as a building material, is still the best option to have a durable and durable house. I have presented both the advantages and drawbacks of using ceramic blocks in the execution of buildings. As a method of research, we presented the technological method of execution of masonry blocks in ceramic blocks and the method of realization of ceramic blocks. The building material, its quality, how it is used, and the cost of each construction material are very important in the execution of a home. We can say that a brick house can last for over 150 years. The lifetime of a brick house is high and the maintenance costs are very low. Even if we see that most old homes have used full brick, it is not as resistant as the Porotherm ceramic blocks. The technology through which they are made is far more advanced than what was available in the past. Ceramic brick blocks are baked at particularly high temperatures and robotic formats with a high degree of precision. Thus, although they have air inlets for better thermal insulation, they are particularly resistant to compression. The field of brick production is constantly evolving. Increasing demands on structural properties and economic issues lead to product differentiation and specialization. For these reasons, we conducted this study on all aspects, both technical, technological, and economic, regarding ceramic brick blocks.

Key words: *ceramic brick blocks, maintenance, thermal insulation, strength, stability, elasticity*

INTRODUCTION

Contemporary architecture requires timeless construction materials that have proven their properties for thousands of years. Ceramic brick and tile have kept pace with the times and trends, while being innovative and modern.

Brick ceramic blocks, like ceramic roof tiles, are designed for durable houses in harmony with the surrounding environment. They have clay in their composition and are then burned in furnaces between (800-1,000) ° C. Ceramic materials can be recycled, taking care of the environment.

Whether we relate to a home that we already have, or we want to build a dream house step by step, there are finally a few important things to keep in mind: the quality of construction materials that ensure a healthy indoor climate and the optimal thermal comfort for you and your family. [2] Buildings built with ceramic blocks and having a ceramic roof represent and have always represented a high quality of living and living space. [4] Brick remains the most beloved building material by both Romanians and Europeans. Every year, according to statistics, over two million new homes in Europe are built of brick. This represents 60% of all new houses and apartments. There are peoples who still use almost all the brick constructions, such as the Italians, the French and the Spanish, who rarely make a home from another material. Even if a brick house is built with more weight. [2]

Brick is undoubtedly the most complete building material - in terms of aesthetic value, diversity, structural properties and economic and ecological aspects. [5] People have intrigued the qualities of bricks, starting to use them from ancient times for construction and today famous.

As Daniel Stoica said in his book, "The durability of the old masonry is explained by the ductility of the lime mortar, which compensates for the churn of the elastic bricks. Due to ductility, masonry is capable of

self-protection in time." [5]
Besides the beautiful appearance of the building or of the house and the roof, a home is truly spectacular if it is durable, energy efficient and if each architectural innovation of the component brings a benefit to the client living inside it. Porotherm bricks are so versatile that they can meet even the most demanding requirements, eventually creating a truly spectacular home. [3]

MATERIALS AND METHODS

In this paper, it was used as a material, the brick, which is one of the most used building materials used in the execution of a building. As a research method, I have presented the technological method of execution of masonry brick blocks, the method of making ceramic blocks, as well as the advantages and disadvantages of this constructive material. Presentation of certain specific technical features, helps the beneficiary in choosing the building material for the execution of his own house. It is obvious that each beneficiary chooses the building material, depending on the material possibilities, the time he has for the execution of a home and his own aesthetic opinion regarding the building's realization. The building material, its quality, how it is used, and the cost of each construction material are very important in the execution of a home.

RESULTS AND DISCUSSIONS

Advantages of brick-built houses

The construction of a brick-built building can be left in red or gray.

The construction of a brick-built building can be left "to red" or "to gray".
Brick houses resist much better weather even when they are not finished. That's why they can be started this year and completed in the next 2-3 years, depending on the possibilities. This is one of the most important advantages of brick houses.
A brick house may remain in the "to red" or "to gray" phase, for long, compared to houses that are made of other construction materials. [6] The only mandatory condition, in order not to deteriorate, is that the building is plastered externally to prevent any infiltration of water between the wall joints. It is also advisable to build the roof.
In general, most beneficiaries prefer to raise their homes in the autumn, with labor and materials being cheaper; to let the winter "to red", which is plastered and the roof made, and in the spring to take up phase "to gray" for summer to complete phase including "turnkey".
Ideal is to build the house "to gray" in the autumn and leave it for at least 4 months, so that the concrete can be perfectly strengthened and the house "sit". Thus, the beneficiary will have the guarantee that the finishes will not degrade over time (cracks, infiltrations, molds, etc.).
Brick is a material that guarantees very good sound insulation. This leads to increased comfort.

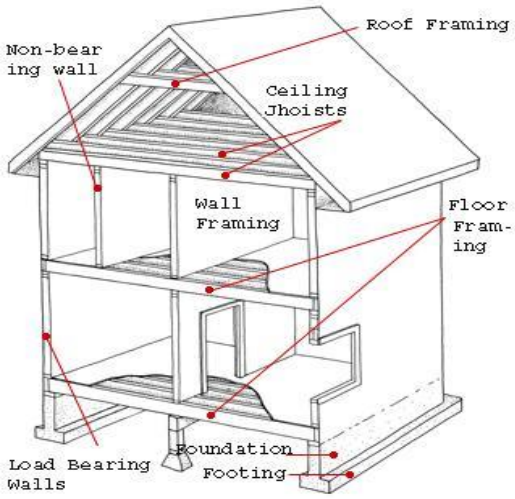

Fig. 1. Structure of a building
The legend: Roof framing, Wall framing, Floor framing, Ceiling joists, Non-bearing wall, Load bearing walls, Foundation, Footing
Source:
https://instalatiipentruconstructii.wordpress.com [10]

Earthquake safety

The masonry of ceramic blocks can be used even in areas with high seismicity. [6] As with other building materials, the type of masonry structure and building configuration must be carefully selected to support the requirements of a high seismic activity area. Ceramic masonry blocks have strong mechanical properties and make a good socket with

masonry mortar, which leads to a high degree of earthquake safety. [8]

Fig. 2. Structure of Porotherm ceramic blocks
Source: www.constructii-neamt.ro [11]

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Fire protection

Bricks are classified as "non-flammable". Non-flammable construction materials reduce the likelihood of being destroyed. That also means I'm immune to fire. The bricks have already passed through the fire in the manufacturing process. In case of fire, the brick does not fire, it is baking.

Soundproofing

Sound insulation measures are required to protect a room from outside noise or from neighbors. The spread of air, impact and noise structure should be minimized. Solid exterior walls, built of ceramic bricks, are characterized by a special value of sound insulation. Ceramic brick walls and ceilings ensure a quiet living without tiring noises inside or outside the building.

Thermal insulation

Brick and its thermal properties

The thermal insulation properties of the bricks are generated by their porosity resulting from the manufacturing technology. A mixture of clay and fine slices is formed. Bricks are formed, dried and burnt at 1,000 ° C. When the sawdust is completely burnt, the pores remain once again filled with air and have the thermal insulation properties. [8] The porosity of ceramic blocks and a good design of the entire system reduce heat loss.

Brick is a good heat-retainer: a brick wall absorbs natural energy from the sun and at the same time preserves the heat emanating from the inside. This heat is resumed inside, even after a long period of time. Brick houses do not cool quickly in the winter and also remain cool during the summer.

Strength and structural stability. Porotherm ceramic blocks are in a large variety of compressive strengths. [6] This is a measure of monitoring and quality control, which leads to the safety of owners and architects.

Brick structures have tremendous stability. Compared with other building materials for masonry, ceramic blocks are also favorable for constructions in areas with high seismicity. High mechanical strength and a strong bond between the ceramic block and mortar ensure maximum safety. [8]

There is already a special ceramic blocks system on the market for areas with high earthquake risk.

The comfort of the ceramic brick blocks

Due to the shape of the voids and the porosity, the exterior bricks reach tremendous thermal insulation values.

A brick wall can absorb the natural energy from the sun and at the same time keep the heat emanating from the house. The brick wall releases the absorbed heat later in the house. [3] This saves heat - temperature fluctuations are balanced by the absorption and release of heat - in the winter the house remains warm and the summer keeps cold.

The brick absorbs the moisture from the inside and frees it quickly outwards. This means that the wall surface remains dry in any season and thus ensures a particularly pleasant climate in the room. [7]

Of particular importance for thermal comfort is the temperature at the surface of the wall: a lower wall temperature than that in the room leads to an uncomfortable climate. The extraordinary thermal properties of the exterior brick lead to a thermal balance in the interior and thus the comfort is superior.

Long life

Brick has always been the first choice for someone who wants a home with pleasant ambience, safety and comfort, now and over many years. [2]

Brick is a material with a lifetime above average compared to other building materials: such as the bricks made of brick during the Romans and the Renaissance and Gothic churches.

A solid brick structure, combined with an appropriate quality, requires minimal maintenance.

All the properties of a brick masonry are maintained for a long time.

The economy of using ceramic blocks in brick, in the construction of houses

Choosing construction material has a small influence on the total cost of the house but is decisive for its quality. With Porotherm blocks, you choose an economical construction system from all points of view, which offers the highest quality and value. With the Porotherm block system you have a short construction time due to the low consumption of materials (mortar, for example). A solid masonry requires low maintenance costs. [1] Thermal protection also saves costs. The life and sales value of a ceramic building block leads to a secure investment for several generations. The walls of the ceramic blocks are economical and durable.

The durability of ceramic blocks in time

Environmental analyst Peter Tappler said: "Ceramic clay blocks are natural and healthy, they are able to breathe, keep the heat and optimally balance the humidity and temperature of the air in the room. In short: clay blocks ensure a climate healthy and pleasant inside the rooms."

The decision to build a house can be a brave step for each of us. There are many views on the choice of ceramic blocks versus other building materials, but the decision belongs to everyone according to their expectations and financial possibilities. To choose a good, robust construction material, you need to have the correct information that will help you better understand what is the most suitable building material for your home.

Building clay materials are able to regulate and protect you naturally from moisture. Thus, the ceramic blocks contribute to the indoor air quality. In addition, houses built with ceramic blocks do not emit any pollutant or allergen in the air you breathe in your home. [4] Studies show that all brick houses generate considerably lower emissions than other buildings with other building materials. Emissions values for Volatile Organic Compounds (VOCs), which are sometimes responsible for the growing number of allergies, are not detectable in building materials based on clay. [7]

Energy efficiency and thermal balance inside the house, due to the use of ceramic blocks in brick

Due to the combination of ceramic blocks and clay consistency, bricks have qualities that other building materials do not have, that is, they isolate the building against the cold and store the heat inside it. This prevents rapid winter cooling and protects against overheating during the summer. [5] This is done without additional thermal insulation on the facade or air conditioning and ventilation systems. Thus, they contribute to a significant reduction in energy demand for heating or cooling. In conclusion, it offers you the full thermal comfort you need, that is energy efficiency and thermal balance inside the house.

Ceramic blocks are environmentally friendly materials.

All clay building materials are durable and environmentally friendly - a ceramic blocks building can have a lifetime of more than 100 years. They are made of natural raw materials (earth, water, air, fire). Moreover, due to the very long lifetime, the initial impact of the material on the environment is very low. Ceramic products generate lower greenhouse gas emissions during the production phase than concrete products sold on the EU market. Values for ceramic products vary between 46 and 75 kg of CO_2/m^3, while values for concrete and AAC products vary between 85 and 120 kg CO_2/m^3. [9]

Clay building materials should not be treated with chemicals to obtain protection against fire or moisture. To improve the quality of

products, only additives that are tested on a large scale eco-friendly are in harmony with humans and nature. [4]

The bricks can provide you with sound insulation. Brick masonry has very good sound insulation properties. The thicker the wall, the lower the noise both from the outside and from the inside.

Other advantages offered by ceramic blocks.

Ceramic blocks are robust, stable and safe even for multi-storey buildings.

Due to their mechanical strength and stability, the walls of ceramic blocks also protect against earthquakes.

They are flame-retardant, being framed at the best fire reaction class.

In addition, the construction has reduced maintenance costs over the lifetime, as ceramic blocks can withstand severe shocks and tensions.

So using state-of-the-art technology and the expertise of the best specialists in the field, Porotherm ceramic blocks are modern solutions with specifications tailored to environmental and climate conditions, according to the building regulations of our country.

We can say that investing in a ceramic masonry construction gives the beneficiary the guarantee of a home where future generations will live in a healthy and safe environment.

Disadvantages of brick houses

As in any real-life situation, there are disadvantages for brick houses, which we will expose below in an attempt to create a more objective image of this type of house.

The disadvantages of a brick house are given by the low thermal comfort, high construction costs and a longer construction period. The "red" cost of the house is given 70% of building materials and 30% of work. [1] Since the cost of materials is the main cost element, the realization of the house in its own direction cannot cause a significant decrease in the final price.

Execution time is high. Brick houses are built heavier than wooden ones, for example, roughly one year. [2]

Houses made of bricks require special foundations. Loads transmitted by the superstructure are large, and in the case of brick houses a complex calculation is required for the foundations dimensioning.

Brick houses have low thermal insulation. Unless an exterior insulation is used, the costs of energy or heating fuel during the cold period will be raised.

The construction of the masonry can be done in several ways, depending on the need of the structure to be able to take over all the forces that could damage the structural bearing system. Depending on the building gauge, there may be a mandatory requirement to place brickwork in a certain way, this method contributing to the load bearing capacity of the masonry wall. The methods of realization are varied and can be easily combined, the joints being able to be along or adjacent to the plane of the wall. [3]

In order to ensure brick masonry full of monolithic content, the bonding of joints is used, so when building the masonry it is necessary to respect the bonding of the joints in the neighboring rows. [6]

When masonry walls are used, the mortar is used as the bonding material.

Mortars used in construction are well homogenized mixtures of binder, water and small aggregate.

Some additives such as: plasticizers, pigments, waterproofing substances, sinks, hydraulic substances, etc. may also be used in the preparation of mortars.

By nature of the binder, the usual mortars are: lime, cement, plaster, clayey; after compressive strength, the mortars may have the following marks: M4, M10, M25, M50, M100 (figures indicating the minimum compressive strength at 28 days, in N/cm^2). At mortar M4, resistance is determined at 90 days and must be 49 daN/cm^2. [2]

A correct design is required to avoid breaking the masonry in any plane, especially the masonry that is part of the assembly of the structural elements that make up the resistance structure.

CONCLUSIONS

After that presented in the paper, we can draw the following conclusions:

-Clay ceramic blocks are suited to building a sustainable home
-Brick, as a building material, ensures a healthy climate within your home
-Ceramic blocks ensure energy efficiency and thermal balance inside the house
-Ceramic blocks are environmentally friendly materials and support the environment
-Bricks can provide you with very good sound insulation
-Load bearing walls in ceramic blocks, have mechanical strength and high stability, protecting the house also in case of earthquakes
-Houses built with ceramic brick blocks offer the thermal comfort required by the beneficiary, namely energy efficiency and thermal balance inside the house

The final decision, however, remains at the discretion of each beneficiary who, depending on personal priorities, aesthetic tastes and last but not least financial choices, chooses construction materials for the execution of his own home.

Pottery blocks Porotherm should be part of any green building strategy. All dwellings, no matter where we are talking about blocks of flats or houses on their own, should meet the challenges of the future. In addition to the beautiful appearance of the building, a home must be sustainable, energy-efficient, so that every architectural innovation in its composition can bring a benefit to the owner living inside it. Porotherm bricks are so versatile that they can meet even the most demanding requirements of a customer.

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