



ABOUT THE METHODS OF BRICK PRODUCTION

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Annotation: *Burnt brick is one of the most popular in the construction of low-rise and high-rise buildings, foundations, basements, technical structures. It has excellent strength, durability, fire, frost and moisture resistance. Due to its unique decorative properties, it is also used for facade cladding.*

Brick is an artificial stone made from mineral materials used in construction. The classic material for the production of bricks is clay. Clay bricks have been known since time immemorial. The technology of ceramics is based on the sequence of the following processes: extraction of raw materials, preparation of raw materials, molding of products, drying and firing. But time does not stand still, and modern technologies allow us to make bricks not only from clay, and not only in the traditional way, which allows us to obtain products with different characteristics, increase strength, improve geometry, expand the color palette or resistance to external aggressive factors.

The main methods of brick production are briefly described below.

Plastic molding method

The method of brick production by plastic molding consists of several stages:

- Extraction of raw materials (clay)
- Preparation of raw materials. The clay is moistened with steam and intensively processed (this replaces the curing process) until a plastic, conveniently formed mass is obtained without large stony inclusions.
- Forming of raw bricks. The clay tape is cut by an automatic device into a raw brick. The size of such bricks is somewhat larger than required, since during the subsequent processing the clay undergoes shrinkage twice (during drying and firing), reaching 10-15%.
- Drying. An important and complex stage of brick production. The simplest way to protect a brick from spreading is to dry it slowly, that is, so that the rate of evaporation of water does not exceed the rate of its migration from the inner layers. When the moisture content of the raw brick reaches 6-8%, it can be served for firing.
- Firing. Furnaces of various designs are used for firing. These are both old ring furnaces, in which bricks are laid and removed manually, and modern tunnel furnaces, where bricks are fired in the process of moving it through the furnace. The firing temperature depends on the composition of the raw material mass and is usually in the range of 950-1000 ° C. The required firing temperature should be strictly maintained until the end of the firing process.



By the method of plastic molding, full-bodied and slit ceramic bricks, warm ceramics, clinker bricks are produced. The brick made by this method is characterized by low water absorption, as a result, high frost resistance and durability. [1,2]

In the production of porous bricks (warm ceramics), additives are used, for example, sawdust, which, burning out during the firing process, form pores that reduce its density by about 30% and increase thermal insulation properties. The low weight of such products reduces the load on the underlying structures, and makes it possible to produce large-format blocks.

Clinker bricks are fired at a higher temperature. The technology and quality of raw materials provide a denser structure, increased strength, frost resistance, durability, but increases thermal conductivity.

Semi-dry pressing method

The raw material for bricks produced in this way is also clay, but unlike plastic molding, clay is moistened to 6-7%, then crushed into powder, from which a raw brick is formed piece by piece on special presses.

Such raw material does not require drying. It can be fired immediately after molding. A semi-dry pressed brick has smooth edges and significantly fewer defects than a plastic molded brick, but at the same time, it is less frost-resistant, which narrows the range of its application.

Production of fireclay bricks

Fireclay bricks are made by firing compressed fireclay powder from burnt ground refractory clay at a temperature of 1650 ° C. Chamotte is a granular material obtained by grinding clay pre-baked to the sintering temperature. It can be replaced with crushed scrap ceramic products.

Fireclay brick is characterized by high fire resistance, strength, resistance to aggressive environments, for example, the action of acids and alkalis, is not subject to deformation.

Production of silicate bricks

Clay is not used in the manufacture of silicate bricks. The raw mix for the production of silicate bricks contains 90-95% sand, 5-10% ground quicklime and some water. The mixture is thoroughly mixed and aged until the lime is completely extinguished. After completion of this process, a brick is pressed from the mixture under high pressure (15-20 MPa), which is sent to autoclaves for hardening at a pressure of 0.9 MPa and a temperature of 175 ° C. The brick hardens in 8-14 hours. Further, the brick is kept for 10-15 days for carbonation, as a result of which its strength and water resistance increase.

The brick obtained in this way has smooth edges with a smooth surface, it does not have those defects that are characteristic of a brick produced by plastic molding, in addition, silicate brick has good sound insulation. But it is much heavier than ceramic bricks, less water- and frost-resistant, its thermal conductivity is higher, such a brick cannot be used in parts of a building with a wet regime: in bathrooms, bathrooms, for laying foundations, basements, plinths.

Production of hyper-pressed bricks

The raw material for the manufacture of hyper-pressed bricks is a mixture of cement, limestone (shell rock), dolomite and dye. Quartz sand, screenings of dolomite, marble, travertine, granite and other rocks can also be used as a filler.

Hyper-pressed brick does not require firing, the manufacturing technology includes double-sided pressing under very high pressure (at least 40 MPa) in special molds. After that, the pressed brick



must undergo the "maturation" procedure in a warm room for at least 5 days, during which the brick receives 60-70% of its final strength. [3]

Hyper-pressed brick has smooth edges and significantly fewer defects than plastic-molded brick. Such a brick can be used for laying foundations (solid), load-bearing walls, facade cladding, during landscaping.

References

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