



ҚАЗАҚСТАН РЕСПУБЛИКАСЫ БІЛІМ ЖӘНЕ ҒЫЛЫМ МИНИСТРЛІГІ
Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ



Студенттер мен жас ғалымдардың
«ҒЫЛЫМ ЖӘНЕ БІЛІМ - 2014» атты
IX халықаралық ғылыми конференциясы

IX Международная научная конференция
студентов и молодых ученых
«НАУКА И ОБРАЗОВАНИЕ - 2014»

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**PECULIARITIES OF CERAMIC WALL MATERIALS MANUFACTURING PROCESS
WITH USING OF TECHNOGENIC INDUSTRIAL WASTES AND BY APPLYING DRY
PRESSING**

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The widespread distribution and availability of clay raw materials, ceramics durability, comfort of brick buildings, brickwork architectural expressiveness and a lot of other factors have caused significant increase of interest in the ceramic wall materials.

Ceramic bricks and stones - are the oldest man-made construction materials, and nowadays more than 30% of building walls are being built from them. Thus, the increase of the production of ceramic face side products is of great importance. [1]

Semi dry shaping (pressing) method and plastic shaping method are used in the manufacture of ceramic bricks, each of which has its advantages and disadvantages. Shaping methods differ in the amount of moisture contained in the molding compound. Plastic 6 method is used for friable clays and mean density clays with moisture no higher than 23-25%; semi dry method is used for heavy-textured clays, hard-to-hydration and treatment and with low career moisture below 14-16%. Semi dry pressing method provides preliminary drying of the raw material and its further grinding to a fine powder, airbrick pressing in molds at specific pressures ten times greater than the pressure of the belt presses. Due to the low initial moisture and single-piece shaping, semi dry compressing brick has a more regular shape and size.

Advantages of semi-dry technology lie in the fact that pressed airbrick is laid directly on the kiln cars for drying on them in drying tunnels or bypassing the preliminary drying directly is send to the firing. Comprehensive mechanization of production is easier than during the process of plastic shaping. Difference of semi-dry technology from plastic is in simplified scheme of raw mix preparation. Semi dry pressing makes easier one of the most difficult and longtime steps of technological process - drying. The brick resulting after all has more sharp edges and corners; it can be used as a facing material.

Using the semi dry pressing method reduces capital costs by 25-30%, and the applying of face brick in comparison, for example, with the facade tiles, gives the opportunity to save (25-30% of the funds) on each square meter of the building wall. [2]

Semi dry pressing method gives the opportunity:

- to use different types of clay raw materials (reduced plasticity clays, clay slates, kaolin clays and clay loams, clays highly-sensitive for drying, clays with high content of carbonates, etc.);
- more evenly mix the components of the charge;
- to achieve a uniform structure of the ceramic shard due to pre-drying and further grinding of clay, it causes high physical and mechanical performances and surface appearance of high quality;
- to simplify transport and laying operations and speed up drying of airbrick under more stringent parameters without cracking;
- significantly reduce shrinkage of products during firing, which allows to obtain products of specified sizes.

Currently, many studies in the field of wall ceramics by dry pressing have been carried on and significant contributions to the theory and practice development have been made by A.S. Berezhnaya, P.P. Budnikov , P.P. Balandin, G.S. Bloh , G.V. Kukolev, R.V. Kondrashev, I.S.

Kaynarsky, M.G. Lundina, M. Yu. Lurie, R.Ya. Popilsky, V.A. Polyuh, M.Ya. Sapozhnikov, etc. In researches great attention paid to the influence of steam humidification on the drying properties of clays and raw drying processes; development the work of drying drums; improvement the pressing process, hardening and increase of ceramic brick freeze-thaw resistance. Today numerous studies on the development of new and updating of further constructions of the mixing and processing equipment have been made, with the improvement of constructions and increasing press power, with the optimization of the initial ceramic mixture with corrective additives, etc.

Semi dry pressing method – is a progressive method of brick manufacturing, it is no use because of demixing mass of fine clay raw material during semi dry pressing. Additional expensive operations are needed for faultless pressing of airbrick: preparing of clay raw material slurry, obtaining molding powder in a spray dryer, drying of the latest to the molding-moisture content. At the same time industrial wastes can be used as part of a granular part of the molding powder.

In this regard systematic researches have been performing over the last years. The research results show the possibility of using various manmade industrial wastes of the Republic of Kazakhstan as part of the granular part of charge in manufacturing brick by semi dry pressing.

In this paper work we show the research results on integral use of wastes of the ceramic wall material factories and metallurgy factories including the industrial development of the technology of semi dry pressing of ceramic bricks.

Technological regulations were specified and worked out during the research of the production of semi dry-pressed brick:

size of the granular part of the charge till full pass through the sieve with diameter of holes - 3 mm, pressing moisture - 6-8 %, pressing pressure - 50-55 MPa, the two-stage pressing on the press CM -1085; burning in circular kiln with a removable crown, burning time - 48 hours, the maximum burning temperature - 1000 °C in redox burning environment.

Semi dry-pressed brick was characterized by the following physical and mechanical properties: compressive strength - 130-160, flexural strength - 35-40, density - 1400-1650 kg/m³, water absorption - 12% and frost resistance - over 25 cycles of alternating freezing and thawing, corresponds to the mark - 125-150. [3]

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