# CERAMIC BRICK PRODUCED IN THE ECOLOGICAL NEGATIVE INFLUENCE ENVIRONMENT

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## ABSTRACT

The article analyses the results of laboratory researches of obtaining qualitative waterproofing ceramic brick on the basis of low-grade loess like loam are resulted. Using the loess loam as the main raw material, scientific and theoretical foundations of the production of clinker brick have been developed. By applying the method of separation of dispersed systems in the processing of raw materials, a method for improving the technological parameters of the molding material is scientifically substantiated. As at the recommendation of a new way of preparation of weight it is reached improvements of parameters of process of formation of a brick.

**Keywords:** clinker, loessial loam, plasticity, the binder obtained on the basis of loessial loam, the degree of clinkerizing, brocken brick, phase-composition, anorthite, cristaboleite, diopside, structure formation, exploitation properties.

## INTRODUCTION

In the result of the dust which consists of mineral salts rising from the dried level of the Aral Sea it is perceived the change not only in the living nature, but also in the composition of raw materials in this region [1]. In the result of it the change in the quality indices of products taken from them is observed. One of such products is the ceramic brick taken on the bases of local loam and loess soils[2].

Along with the physical-mechanical features of ceramic brick in evaluating its quality indices the important feature is its view of surface, i.e. its decorative feature. One of the main raesons of not meeting the up-to-date requirement of the decorative feature of ceramic brick produced in the region of Aral Sea is the appearance of “white spots” in its surface[3].

The “white spots” in the surface of the brick are the defects, which are the results of more than needed mineral salts in the, composition of raw materials, which do not

break up in the baking process of the brick and do not participate in the appearance of silicates by remaining free. If the process of baking of the brick organized in the “fast” regime, this case will, be very noticeable[4].

**THEORIES**

The process of baking of the brick in the “fast” regime will bring to spend short time the strong phase effecting reactions in the mass, also the mechanism of appearing the silicates, in the result of it the process will not be full. If the process is not organized properly, CaO, $CaSO_4$ or salts like those in the composition remain free, after wards $CO_2$ or steam in outer environment will react, and carbonization and hydration will be observed. In the result “white spots” which consist of mixture of mineral salts will appear in the surface of the brick[5].

Received ‘‘white sports’’ are addressee in chemical respect; they will not only worsen the decorative features of the brick ,but also will bring into the corroziation of inner layer of the brick[6].

In the baking process in laboratory experiments in the result of time and temperature mineral salts remain in the composition of the mass of the brick and their diffusation mechanism from inner layer into outer layer of the brick is studied [7]. In particular the chemical analyze of taken examples from the surface of the brick in its baked time shows that there was not the amount of free mineral salts[8].

After 20 days the appearance of hydroxide and sulphate, carbon salts of alkaline solution and alkaline solution metals in the example taken from the surface of the brick which was kept in moist environment was recorded. The mechanism of appearance of mineral salts in the surface of the brick will go on example of mechanism of gyps’ mineral salts as fallowing[9]:

The dehydration of gyps mineral[9]:

$CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 + 2H_2O\uparrow$

The breaking up of the received $CaSO_4$ in 1000-1200 $^oC$ will go in the following way[9]:

$CaSO_4 \rightarrow CaO + SO_3\uparrow$

Received CaO is diffused from the inner layer of the brick into the outer layer an reaction between moisture in the composition of air and $CO_2$ is observed.

$CaO + CO_2 \rightarrow CaCO_3$ or $CaO + H_2O \rightarrow Ca(OH)_2$

In orden to avoid such process it is necessary to receive appropriate stable component and combination of CaO in the mass with other components. In organ sing such real along with temperature and time the amount of reacting component is needed. For this necessary to have mineralization addition which has an opportunity to get stable combining with CaO and break up in such circus trance [9].

## RESULT AND DISCUSSION

In orden to improve the decorative feature of the ceramic brick we are offering new way of processing to the mass of the raw material. This way is based on laboratory they consist of soaking the raw material and dissolving the mineral salt which are in composition of raw material, dividing the mass into fractions and adding the plasticized in definite ratio to the main mass of the brick. The sandy loam is composed of light brown or gray rock and is a complex mineral. The chemical composition of the raw material samples by traditional methods is shown in Table 1.

**Table 1. Chemical composition of the sandy loamy deposit of Yormish deposit**

| Examples | The amount of basic oxides,% | | | | | | | | i. l. |
|---|---|---|---|---|---|---|---|---|---|
| № | $SiO_2$ | $Al_2O_3$ | $TiO_2$ | $Fe_2O_3$ | CaO | MgO | $Na_2O$ | $K_2O$ | |
| 1 | 57,08 | 12,57 | 0,49 | 5,70 | 12,23 | 3,03 | 0,96 | 2,05 | 5,89 |
| 2 | 57,10 | 12,55 | 0,45 | 5,74 | 12,13 | 3,13 | 1,05 | 1,96 | 5,89 |
| 3 | 57,06 | 12,59 | 0,44 | 5,75 | 12,29 | 2,97 | 1,02 | 1,99 | 5,89 |
| Medium | 57,08 | 12,57 | 0,46 | 5,73 | 12,21 | 3,05 | 0,99 | 2,02 | 5,89 |

Chemical analysis of raw materials shows that the average SiO2 content is 57.08%. [4,5] Sources say that the content of SiO2 in the raw materials for producing high quality ceramic bricks is limited by certain standards. The content of Al2O3 in the raw materials used in the experiments is on average 12.5%. This amount is not enough to produce good quality ceramic bricks. The amount of CaO is also much higher than the set standards, which may not allow you to get good quality bricks.

According to the results, the quartz mineral content in the raw materials is relatively high, up to 29%. It was noted that the hydroxyl content is up to 26%, and kaolinite and monmorillonite are low and the feldspar minerals are up to 15%. Some technological features of the sandy loam are shown in Table 2.

**Table 2. Some technological properties of sandy loam**

| Fire resistance, oS | Atterberg plasticity,% | Linear shrinkage in the air,% | Drying Sensitivity Coefficient (Chijsky Method), Sec | Mechanical strength in compression, MPa | Volumetrik massa, $kg/m^3$ |
|---|---|---|---|---|---|
| 1100 | 6,95 | 4,01 | 180 | 2,11 | 1425 |

Mechanical activation revealed that the amount of mineral salts in the raw materials also decreased significantly.

**Table 3. Mineralogical composition of mechanically activated binders**

| Minerals, e.g. .% | | | | | |
|---|---|---|---|---|---|
| Clay minerals | Field traverse | Quartz | Dolomite | Calcite | Chloride |
| 58,1 | 7,5 | 24,4 | 4,5 | 4,0 | 1,5 |

Liquid suspense was prepared in the solid phase ratio 10:1 from the mixture on material. The dissolution of salts in the composition of raw material which is add suspense was received by intensive mixing in the 80°C water temperature . In the result the dissolution of some parts of mineral salts were observed. We indicated it by measurer pH ratio of suspense was indicated as equal to 9,00 several experiments were done in dividing the fractioned sin kings into parts by the w decantation and adding the middle layer parts into the mass of the brick. The information experimental test composition is given in table 4.

**Table 4. The ratio of compositions taken for experiment**

| Compositions | The composition of the mass, % | | | | |
|---|---|---|---|---|---|
| | Loam soil | Plasticized mass | | | |
| | | P-1 | P-2 | P-3 | P-4 |
| Traditional composition | 100 | - | - | - | - |
| The compositions of the experiment | 80 | 20 | - | - | - |
| | 85 | - | 15 | - | - |
| | 90 | - | - | 10 | - |
| | 95 | - | - | - | 5 |

The examples according to the size of the brick and upper compositions were prepared. Taken examples were processed in baking and drying processes in the enterprise circum-stances (“Dilshodqurilishgist” joint-stock company). The physical-mechanical and decorative features of ready production were tested in the laboratory circumstances. The taken results are given in table 5.

**Table 5. Comparative table of bricks obtained as a result of the experiment**

| | The mechanical strength of the example to pressure, kg/cm$^2$ | Absorption of the example, % | Outer view | |
|---|---|---|---|---|
| | | | In 4 hours after baking process | After 20 days in the moist environment |
| Traditional composition | 60 | 24 | Yellow, there are cracks in the surface | There are 70% “white spots” in volume to the volume of the surface of the brick |
| P-1 | 90 | 16,0 | Yellow, no cracks | No “white spots” |
| P-2 | 82 | 18,0 | - | “white spots” are not almost noticed |
| P-3 | 75 | 20,0 | There are yellow small cracks | There are “white spots” like dots in the surface of the brick |
| P-4 | 65 | 22,0 | No “white spots” | There are 30 % “white spots” in the volume to the volume of the surface of the brick |

## CONCLUSION

In conclusion it is necessary to stress that one can improve the decarative features of the brick by not bringing the additional raw resources (mineralizators) to the enterprise in the local circumstances in the appropriate technological circumstances and to add 20% “plasticized” part which appeared in the middle layer into the mass.

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