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Structural Analysis of Heat-Resistant Heat-Resistant Plate from Brick Battle

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ABSTRACT: The article highlights the structural aspects of the analysis of structures of heat-resistant ceramic concrete slabs intended for covering the surface of brick ovens. As a coarse aggregate in the manufacture of a heat-insulating plate, a brick battle was used, which determines the macrostructure of the concrete of the plate.

Keywords: brick, kiln, heat-resistant board, strength, porosity, structure, analysis, coarse aggregate, building structures, experimental research.

1. Introduction

In the Republic of Uzbekistan, large-scale measures are being taken to introduce energy and resource-saving technologies in the construction industry. In this regard, research on improving the quality and introducing new technologies in the production of building materials is of great importance.

As you know, when bricks are fired, the temperature inside the kiln reaches 1000 ° C. As a coating, mainly temperature-resistant kaolin wool was used. The term of using kaolin wool in the construction of the coating is only 6-8 months. The lack of a practical high-temperature-resistant trench kiln coating design led, among other things, to a decrease in the quality of bricks. At the same time, the main reason for the decline in the quality of bricks is the difficulty of ensuring the required temperature inside the furnace.

In this regard, we were given the task of conducting scientific and experimental research on the search for trench kilns for firing bricks - coatings resistant to high temperatures based on local industrial waste.

As a result of the research carried out, a heat-resistant reinforced concrete structure of the coating of the kilns has been developed. The proposed reinforced concrete structure of the pavement, in contrast to conventional structures, is prepared using broken bricks obtained from brick production and construction waste as a large aggregate. It can also be noted that the presence of a large aggregate - brick broken, provides the strength of the coating.

Brick breakage is involved in the formation of the macrostructure of the reinforced concrete slab. In this case, the strength, the nature of the debris, the shape and granulometric composition of the brick breakage are of great importance.

At the same time, the sand used as a fine aggregate participates in the formation and mesostructure of the reinforced concrete slab and, together with the cement paste (influencing the water-cement ratio), in a certain sense, also participates in the formation of the macrostructure of the slab. The optimal consumption of the cement-sand mixture is determined depending on the shape of the coarse aggregate grains and the size of the sand grains.

In general terms, the multi-structured concrete system is subdivided into microstructure, mesostructure, and macrostructure. For the preservation and accumulation of heat in a reinforced concrete slab, porosity is of great importance, since it reduces the degree of thermal conductivity. In connection with this, one of the important characteristics of a reinforced concrete insulation slab is its porosity.

Until now, many scientists have carried out numerous studies to study the thermal resistance of reinforced concrete structures and their materials, great scientific results have been achieved [1,2,5]. However, these studies considered the flammability of existing buildings and structures, as well as reinforced concrete structures, the conditions of the stress-strain state in structures in the event of a fire. The effect of high temperatures (600–1000 ° C) for a long period (10–12 h) has been poorly studied, and insufficient research has been carried out to create heat-resistant structures. In particular, research on the technology for the production of heat-resistant ceramic concrete structures based on industrial waste is underdeveloped.

Methods

In order to study the thermal quality of the developed heat-resistant reinforced concrete slab, the porosity of the building material of the reinforced concrete slab was studied. Fourier infrared spectrometry (SHIMADZU, Japan,

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2017) [2] was used. The internal structure of the prepared samples was studied and analyzed. The number of oscillograms on the scale of the spectral range was 4000 ÷ 40 mm$^{-1,}$ the allowable was 4 mm-1, the signal-to-noise ratio was 60: 1, and the imaging rate was 20 spectra per second.

The symbolic porosimetry method was used to study the porosity of refractory concrete using the Thermo Scientific Pascal 240 EVO symbolic porosimeter and the three composition types in the study. All samples were placed on a CD3 dilatometer, the air in the pores was removed using a vacuum device and filled with mercury. Then the dilatometer was placed in an autoclave of a Pascal 240 EVO mercury porosimeter, and the mercury penetration was 200 MPa. Using special available software, the total porosity (%), specific and relative volumes of porosity (mm3 / g) were determined.

Results and discussion

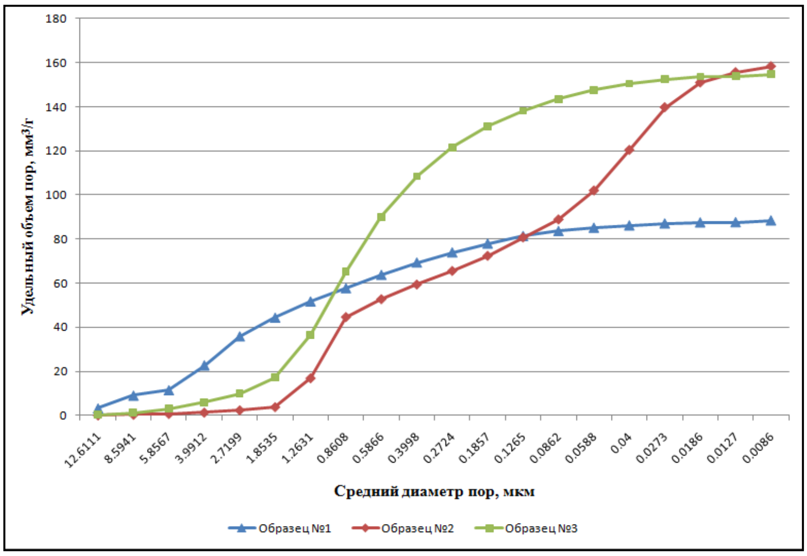
The new heat-resistant reinforced concrete slab is made on the basis of industrial waste and is intended for use in trench kilns for firing bricks. In the manufacture of the proposed heat-resistant reinforced concrete slab, brick fragments in construction are used as a large aggregate. In recent years, scientific research carried out at brick factories in Namangan and Andijan regions has shown that new heat-resistant ceramic-concrete heat-insulating slabs are resistant to high temperatures in brick ovens. The heat-resistant plate has been successfully tested for 5 years at brick factories in Namangan and Andijan regions.

Porosity plays an important role in heat retention in the construction of reinforced concrete slabs, since the degree of heat retention is provided by porosity. Therefore, one of the most important characteristics of reinforced concrete slabs is porosity. Based on this, 3 types of samples (I, II, III) were prepared for the experimental study of porosity-conductivity-heat resistance, and the porosity in their structures was investigated in several compositions. The indicators of the structural porosity of the prepared samples are presented in table No. 1:

Characteristics of the structural porosity of the samples, table No. 1

№	Indicators	unit of measurement	Samples		
			I	II	III
1	Total porosity	mm^3 / g	88,38	158,15	154,75
2	The total pore area is	mm^2 / g	1,376	11,906	3,077
3	Average pore diameter	micron	0,2569	0,0531	0,2012
4	Diameter between pores	micron	1,5094	0,1107	0,5941
5	Modal pore diameter	micron	0,0098	0,0089	0,0091
6	Total porosity of the sample	%	19,391	30,212	29,444

Analysis of the above data shows that the total porosity of the first component is 19.391%. In the second composition, the main set of pores was in the range from 1.26–0.18 µm to 0.0588–0.0186 µm. The total porosity of the content was 30.212%. The total porosity of the third investigated component was 29.444%. It was found that the main porosity is in the size range of 1.26-0.0862 microns. Based on the research results, a comparative table of the relative pore sizes of the samples was developed (Fig. 1):



Rice. 1. Graph comparing the relative pore volume of the samples.

According to the research results, it was found that the total porosity of a heat-resistant structure is in the range of 20-30%. Therefore, it was noted that the manufacture of heat-resistant structures of these parameters can meet the regulatory requirements for them [2,3,4].

Subsequent research focused on microscopic analysis to study the composition of refractory concrete and the new composition in its structure. This, in turn, helped to get information about the new lineup. The studies were carried out on the existing SHIMADZU device in the laboratory of the Center for High Technologies in Tashkent. 3 (I, II, III) compositions were used as samples: I) a brick sample of the Shokhidon brick factory (Namangan region); II) A sample of bricks from the Khanabad brick factory (Andijan region); III) a sample prepared in laboratory conditions (NamISI).

Conclusions. In general, it is recommended that the selected composition of the proposed heat-resistant reinforced concrete slab for brick ovens should also be used to cover the walls of heating units.

References

1. Milovanov, A.F. Resistance of reinforced concrete structures in case of fire: textbook / A.F. Milovanov.-M .: Stroyizdat, 1998.-304 p .: ill.-ISBN 5-274-01695-2.

2. Adilkhodzhaev, A.I. Investigation of porosity of a cement stone with a zeolite-containing filler and a superplasticizer / A.I. Adilkhodzhaev, I.A. Kadyrov, K.S. Umarov // Bulletin of TashIIT.-2020.-№ 3, - P.15-22.

3. GOST 10180-2012. Interstate Council for Standardization, Metrology and Certification. Concrete. Methods for determining the strength of control samples. -M .: Standartinform, 2013. -31c.

4. GOST 20910-2019 Heat-resistant concretes. Technical conditions. Interstate standard. Heat-resistant concretes. Official edition. -M .: Standartinform, 2019. –17c.

5. Alinazarov, A.Kh. Helioteplochemical treatment of multicomponent cement compositions / A.Kh. Alinazarov, S. Zh. Razzakov, E.S. Zhuraev, Y. N. Rakhmatullaev. // Proceedings of the III International Scientific and Practical Conference “Quality. Technologies. Innovations ": collection of scientific articles. - Novosibirsk NGASU (sibstrin), 2020 .-- S 206-218.

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