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THE USE OF OIL-CONTAMINATED CRUSHED STONE SCREENINGS IN CONSTRUCTION CERAMICS

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Abstract

The article deals with the problem of disposing of oil-contaminated ballast screening, resulting in the repair and replacement of railroad tracks, in particular, the use of secondary aggregates. Secondary screening of crushed stone with grain size less than 5 mm contains up to 8% oil. The study of this fraction on phase and granules metric composition and physical and mechanical properties allowed the authors to recommend it as leaner for the construction of ceramics with improved performance characteristics. This solution gives the opportunity to improve the physic-mechanical properties of ceramic bricks and also save non-renewable resources, in the form of natural gas and sand, which has a positive impact on the environment. Thus, when using screening of ballast crushed stone in building ceramics production, reducing the amount of waste exempt land under landfills, and manufactured construction materials of improved quality.

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Keywords: oil-contaminated ballast gravel, ceramic bricks.

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Introduction

Disposal of oil-contaminated waste ballast of crushed granite in railway transport with the travel part often creates environmental compliance requirements of the problem [1-4].

Currently, a huge amount of oil-contaminated waste is stored in rail transport, which cause irreparable damage to the environment, penetrating into the upper layers of the soil, leading to degradation of fertile.

Disposal of waste by a sand cushion device between the ballast and subgrade in the construction of railways. It leads to a secondary pollution of the environment of petroleum products, and warehousing along the railroad tracks leading among other things to clogging storm manholes and the fragility of the railroad tracks [5-8].

Difficulties with tree-such waste in specially engineered landfills are associated with high material costs and a lack of the empty platform [9]. Attempts to clean and re-use of ballast rubble, so existing rubble treatment plants on the railroad after sieving rubble recycled fraction 25-60 mm for re-laying the road, and gravel with a grain size of 12-25 mm is used for laying on the access station tracks. However, a fraction of less than 12 mm is transported to intermediate storage for subsequent decontamination and disposal.

Main part

The aim of the work: is the utilization of oily fractions of crushed stone at least 12 mm.

From the literature it is known the use of industrial waste in the preparation of ceramic bricks [10-17].

Earlier studies in the department "Engineering chemistry and natural science" PGUPS [18-19] it proved, petroleum products that are adsorbed on solid particles of sand and soil with a size of less than 1.25 mm, then the fraction of crushed granite 5-12 mm can be used as an inert filler in the manufacture of concrete products. Screenings fraction containing less than 5 mm in its composition up to 8% of oil may find use in the production of ceramic bricks as placeholder, since earlier studies positive effect on sintering of the ceramic matrix burnable organic material was shown [20-21]. Besides, currently there is a shortage of conditioned placeholder - sand gradation factor (M_s = 1,8 ... 2,2). Module size oil contaminated ballast rubble have been identified, which amounted to M_s= 2,16, which confirms its suitability.

Chemical analysis of oil-contaminated ballast gravel screenings showed the presence of other than SiO_2 Fe_2O_3 and MnO and 10% may indicate that more surface-active waste compared to sand. Besides, the presence of particles of the ballast gravel screenings will be reinforced with a matrix of clay bricks, which can improve the performance of brick, such as strength, frost resistance and water absorption.

Thus, in its mineralogical composition and particle size of the fine fraction of waste suitable as placeholder for manufacturing ceramic brick. Contained in the waste oil at a temperature of 1000 °C decompose into carbon dioxide and water, and the heavy metals present in the fuel oil (Fe, V, Ni, Mn, etc.). Remain in a clay matrix and reliably "immure" forms a liquid phase during firing. All this will reduce the amount of oil entering the environment, thus increasing the strength properties of the ceramic bricks.