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## Additional Raw Materials For The Production Of Building Materials

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### ABSTRACT

The article presents the results of the study of construction waste - fragments of concrete and reinforced concrete elements, confirming the possibility of using them as additional raw materials in the technology of multicomponent cement binders.

### KEYWORDS

Utilization of construction waste, screening of crushing of concrete scrap, grinding, assessment of the ability to hydraulic hardening, fractions of concrete scrap, specific surface area, physical and mechanical properties of the binder.

### INTRODUCTION

The current ecological state of the territories in the republic leaves much to be desired. Intense pollution of the environment continues. Despite the existing environmental state and regional programs for environmental protection, their implementation is delayed and there is no noticeable improvement in the environmental situation [1].

Special mention should be made of the problem of utilization of municipal solid waste (MSW), consisting of industrial, household

waste and construction waste. At the same time, the share of construction waste naturally increases due to an increase in the volume of reconstruction, modernization of civil, industrial buildings and settlements of the country. There is currently no unified database on the collection, disposal and processing of industrial, construction and household waste.

Annually, about 80 million tons of industrial waste is generated in the country, 14 percent of which are toxic and 15 million tons of solid

waste. About 12.5 thousand hectares of land have been allocated for the organization of landfills for waste disposal, not counting spontaneous uncontrolled dumps [2].

Modern requirements for the organization of collection of solid waste in the republic are met in part. In particular, garbage collection points have been created and containers installed in the surveyed residential areas of Tashkent. However, garbage sorting is not carried out and the number of containers is insufficient, which leads to the formation of unauthorized dumps (more than 1700 identified). In regional centers and rural settlements, services for the collection and removal of household waste cover only 30 percent of the population. For the majority of residents, the lack of waste disposal remains a significant problem. To eliminate it requires the purchase of about 1200 units of specialized transport [2]. The described state is typical for almost all regions of the republic.

With the noted annual volume of solid waste output, their competent well-functioning organization of collection and sorting for the intended consumer will contribute to economic benefits due to the use of construction waste as a secondary raw material for the production of construction products, reduction of the cost of fuels and lubricants, wear and tear of vehicles and equipment for recycling and reloading waste.

By the Resolution of the President of Uzbekistan dated September 29, 2020 "On measures to further improve the management system of activities in the field of handling household and construction waste" and the Resolution PP-4925 dated December 15, 2020 "On measures to improve activities in the field

of handling household and construction waste », Outlined further steps in resolving the problem of construction waste [3].

The documents noted the negative impact of solid waste on the environment. Construction waste is almost never recycled. At the same time, construction waste is unused raw materials that have completely or partially lost their original properties. Reuse of waste reduces the consumption of raw materials, which leads to a decrease in environmental pollution. The use of construction waste is decided according to the principle of waste-free technology - the type of production organization using raw materials and energy in a closed cycle "raw materials - production - consumption - secondary raw materials". today the industry still cannot free itself from the uselessly accumulated waste. new technologies in certain industries lead to an even greater formation of unnecessary raw materials and recycled materials [4].

The lack of cement binders dictates the need to search for available raw materials for their production [5]. The studies of the authors of fragments of concrete samples (concrete scrap) taken from the structures of buildings demolished after accidents during the reconstruction process after 15 years and 20 years of operation showed that the strength of samples of the mortar part of concrete after 15 years of operation was 3.8 MPa, and from concrete after 20 years operation -1.2 MPa, which indicates the preservation in concrete after 15 years of operation of a larger amount of clinker fund.

In modern concrete technology, multicomponent binders are widely used to

save cement and improve a number of construction and technical properties.

The multicomponent structure makes it possible to effectively control structure formation at all stages of the technology and to obtain materials with a wide variety of complexes of properties [6]. At the same time, the multicomponent system of the binder increases the requirements for the dosage of components, grinding, specific surface area, mixing, homogeneity, which can only be ensured through the use of appropriate equipment and technologies.

Until now, among scientists there is no consensus on the mechanism of the effect of high dispersion mineral fillers on the structure and properties of cement stone and cement concretes. In particular, recently the question of the nature of the so-called “microfiller effect” has been discussed, which is expressed in an increase in strength when inert finely dispersed mineral fillers are introduced into concrete.

Construction waste, like all other known waste, has heterogeneous properties and a

range of physical and technical indicators. It is possible to increase the homogeneity of construction waste by using their mechanical activation.

Grinding should be carried out in mills with an optimal load of cylpeps and balls based on the hardness of the grinded fragments, which contributes to increased energy savings due to the preservation of grinding time. To facilitate grinding, aqueous solutions of chemical additives are introduced.

The possibility of obtaining binders obtained by grinding concrete scrap with various parameters of the granulometric composition has been studied. To assess the ability to hydraulic hardening, the obtained fractions of concrete scrap were ground in a laboratory mill to a specific surface area of 400 m<sup>2</sup> / kg. The powders obtained by grinding individual fractions were mixed with water until a dough of normal density was obtained. The results of testing samples at 28 days of age are shown in Table 1.

**Table 1 - Physical and mechanical properties of binders depending on the fraction of concrete scrap**

Scrap fraction, mm	I/O	Compressive strength, MPa			
		2 cyт	7 cyт	28 cyт	Thermal and moisture treatment
0,00-0,16	0,32	3,2	4,3	6,8	4,9
0,16-0,315	0,32	3,5	3,7	6	4,1
0,315-0,63	0,31	1,7	3	3,8	2,9
0,63-1,25	0,31	2	3,1	3,4	2,7
1,25-2,5	0,31	2,2	2,3	4,4	3,5
2,5-5	0,3	2,1	2	4,1	3,2

The presence of unreacted alite and belite particles, as well as calcium hydrosilicates of various basicities in the screenings of crushing of concrete scrap of clinker fund, as well as calcium hydrosilicates of various basicity, leads to acceleration of the hydration processes of Portland cement clinker minerals and the synthesis of neoplasms of various composition and morphology with the formation of a strong homogeneous structure, as evidenced by the data of physical and mechanical properties of the binder (see table 1, table 2).

The influence of particles of concrete scrap on the structure of the hardened binder, depending on its specific surface, was investigated. Investigated binders with a specific surface area of 600 m<sup>2</sup> / kg; 900 m<sup>2</sup> / kg; 1200 m<sup>2</sup> / kg; 1400 m<sup>2</sup> / kg. It was found that all binders are characterized by a stable set of strength (table 2).

**Table 2 - Physical and mechanical properties of binders depending on the specific surface area of the binder**

W / W	Ssp, m2	Compressive strength, MPa, age, days		
		2	7	28
0,32	600	7,5	11,8	14,4
0,36	900	16,5	21	25,5
0,38	1200	17,4	23,5	27
0,39	1400	14,8	14,5	20,3

Binders obtained in a vibration mill from concrete scrap fractions (0.00–0.16 and 0.16–0.315 mm) meet the requirements of regulatory documents for setting times and physical and mechanical indicators, which makes it possible to recommend them for use as binders when receiving building products and structures for various purposes.

Thus, the possibility of using as additional raw materials - construction waste - fragments of concrete and reinforced concrete structures (concrete scrap) for the production of building materials is shown.

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