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Reinforcing in the Production of Gypsum Materials on Base Basalt Fibers

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Abstract: *There are given properties of testing in nano-lab-testing and using it in gypsum materials nowadays. The addition of basalt to the gypsum is carried out as follows: it is poured into the dry consist and mixed. Thus, the addition of basalt reduces shrinkage deformations and improves the technological properties of dry mixes.*

Key words: *basalt, dry mix, gypsum, crack, composite.*

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Introduction

Micro-reinforcing properties of basalt, which content of silica (SiO_2) ranges from 42 to 52-53%, the amount of Na_2 + K_2 alkalis up to 5%, in alkaline basalts up to 7%., allow it to be effectively used in the production of paints and dry mixes. As micro-reinforcing properties of basalt, provide dimensional stability manufactured with its use of materials is the property most desired in the production of dry building mixes (DBM) for various purposes, drying which is the problem of various-shrinkage is particularly acute. Natural mineral, the so-called basalt is a natural silicate of white or light gray color with the chemical formula SiO_2. Basalt - formed in the presence of insoluble residue SiO_2 (fig.1).

Materials:

With good adsorption properties, it eliminates the formation of high, which is especially important when using decorative, colored mineral and organic pigments mixtures. Micro-reinforcing properties of basalt and high adhesion to surfaces provide increased strength characteristics of gypsum building mixtures and the value of their strength of adhesion to the surface [1]..

On multiple studies and in modern practice in the construction industry to improve dimensional stability, minimize cracking, give dimensional stability and to improve the mechanical performance of various products and composite materials, manufactured based on Portland cement, aluminous cement, anhydrous gypsum, use different types of reinforcing fibers of inorganic (organic) nature.

The development of basalt technologies poses a number of topical research tasks: 1. study of the operational stability of basalt fibers under normal climatic conditions and at elevated temperatures, as

well as under thermal cycle conditions; 2. analysis of the problem of utilization of basalt fibers after completion of operation; 3. The problem of the danger of basalt fibers for a person in the workplace and in the living quarters. The results of studies already carried out allow us to formulate certain conclusions: o Basalt fibers are formed by an amorphous substance of variable composition and have a developed surface of varying degrees of roughness. It is necessary to study the characteristics of the fibers obtained from this raw material using a certain technology. The current regulatory documents for determining the hydrolytic resistance of vitreous materials do not take into account the features of the structure and structure, as well as the heterogeneity of basalt fibers. o As far as workplace safety is concerned, basalt fibers should be classified as an airborne variable chemical.

Fig.1. Type of basalt

The main quality of basalt, it does not dissolve in water and organic solvents, but interacts with hydrochloric acid. For natural basalt characteristic elongated along the length of the crystal structure, while cracking the grain which the formation of acicular form.

Methods:

The needle and porosity shape of basalt grain determines the main direction of its use as a micro-reinforcing filler [4]. Basalt is the only pure white filler having the form of columnar oblong crystal with the ratio of fiber length to its diameter depending on the brand (L:D) from 3:1 and above (tabl.1.).

Technological parameters of basalt [1-5]

table 1

№	Characteristic	Factor
1	Hardness on scale Moos	3,5-4,0
2	Density, g/sm^3	2,6-2,7
3	The Alkaline factor, pH. 10% water suspension	7,5-10,0
4	Natural moisture, %	0,1-0,4
5	Bulk mass, kg/m^3	1050-1400

Acicularity is the defining property for the hardening of the coating films and coatings for enhancing their durability and wear resistance. In connection with the deteriorating environmental situation, it should also be noted that basalt is a substitute for substances such as asbestos and fibrous talc [3]. Represents fiberglass or basalt-plastic rods with a diameter of 2.5 to 32.0 mm, up to 12 meters long (or twisted into coils) with various finishes.

Chemical composition of basalt in countries of Asia and in other countries [1-5]
table 2

Oxids	Uzbekistan				Russia		
	Koytash field	Change field	Langar field	Pribaykal field	East field	Aldan field	Bosagin field
SiO_2	47—52	47,28	51,50	51,41	51,70	49,36	52,0
TiO_2	1—2,5	46,10	46,90	46,27	47,38	45,81	39,9
Al_2O_3	14—18	1,00	0,05	0,56	0,10	0,58	2,97
Fe_2O_3	2—5	0,74	0,16	0,30	0,06	1,22	0,52
FeO	6—10	-	-	-	-	-	-
MnO	0,1—0,2	-	-	0,17	-	0,50	0,60
MgO	5—7	0,14	0,1	0,01	-	0,44	0,14
CaO	6—12	1,09	0,03	0,14	-	-	0,40
Na_2O	1,5—3	1,36	-	0,22	-	0,35	0,40
K_2O	0,1—1,5	2,29	1,26	0,92	0,76	1,74	3,07
P_2O_5	0,2—0,5	0,1	0,1	0,1	0,1	0,1	0,1
total	100	100	100	100	100	100	100

The main reserves of basalt are concentrated in the Asia countries, China, USA and India. Quite large deposits of basalt scarns are known in Mexico, Canada, Finland, Australia, Kenya, Japan, New Zealand, Sudan, South-West Africa and the former Yugoslavia. The main producers of wollastonite are the USA and China (table 2). According to China National Non-metal Minerals Industry Corporation, enterprises Li-Shi Basalt Mining Company and Pan Shi Basalt Mine Are engaged in the production of basalt in the country. The material is exported, mainly to Japan.

According to the compositions, properties and forms of basalt particles, the following areas of its application are determined:

-Housing, civil and industrial construction
-Mining industry
-Road construction
-Bridge construction
-Reinforced concrete tanks, storage facilities for wastewater treatment plants and chemical plants
-Housing and utilities facilities
-Sewerage, melioration and water disposal
-Strengthening the coastline
-Offshore and port facilities
-Foundations below ground level
-Contact network supports

Results:

Basalt-containing dry mixes are recommended for repair and finishing works on any bases: concrete, brick, plaster, drywall, asbestos cement, etc.

It should be noted that a rational selection of raw materials formulations and technological parameters of the production process is required, taking into account the normalized properties of

finished materials and products.

A wide range of applications of these mixtures is mainly due to the presence of basalt in their composition. On average, the amount of basalt supplementation in CCC is about 5-10% of their weight, varying in some limits depending on the purpose and type of material. In the closed form they are very plastic, easy to apply and have good adhesion to various surfaces. Basalt increases the water-holding capacity of the closed mixtures, enhances their structure formation and completely eliminates shrinkage during solidification. With good adsorption properties, it eliminates the formation of, which is especially important in the application of decorative, mineral-colored and organic pigment mixtures. Micro-reinforcing properties of basalt and its high adhesion to surfaces provide increased strength characteristics of CCC and the strength of its adhesion to the surface [6].

The minimum compressive strength of these solidified mixtures is 15.0 MPa. They are absolutely weather -and frost-resistant, which allows them to be successfully used for external repair and finishing works, as well as for the repair of facades. These works developed instructions on determining the consumption rate of additives to prepare quality mixes as-

-Manufacture of gypsum products (facade cladding, decorative artificial stone) – 0.39-0.78 kg/m3;

-Dry mixes and plasters – 0,6-0,8 kg/m3;

-Cement-sand screed, paving slabs and other coatings with high load – 1.6-2.7 kg/m3.

Conclusion:

The addition of basalt to the mortar is carried out as follows: it is poured into the wet mortar and mixed. Thus, the addition of basalt reduces shrinkage deformations and improves the technological properties of gypsum mixes.

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