Spectrum Journal of Innovation, Reforms and Development
Volume 09, Nov., 2022 ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

BASALT FIBER CONCRETE PROPERTIES AND APPLICATIONS

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Abstract
Technical characteristics of basalt fiber are shown: Concrete made using basalt fiber has its own characteristics, which differ significantly from other fibers. Areas of application of basalt fiber are given.

Keywords: Basalt fiber, concrete mix, basalt fiber reinforced concrete, cement stone.

Introduction

Basalt fiber is a piece of complex basalt fiber of a certain length in the form of crushed monofilaments. Basalt fiber is a fiber whose inclusion increases the tensile strength of concrete, it has several advantages over synthetic fibers, as it is one of the strongest mineral fibers known to man. Fiber has become an increasingly popular reinforcing material in various concrete mixtures in recent years. There are several types of fiber, these include the following types: steel, polypropylene, fiberglass, polyamide and basalt fiber.

There is another problem in the construction market - it is not uncommon to sell fake alkali-resistant fiberglass with a fairly low cost. Using such a fiber, reinforced concrete is obtained only at the initial stage of hardening. And later, in place of the fibers that disintegrate in the alkaline environment of concrete, oblong-shaped voids are formed, which drastically reduce the quality of products, with the risk of material destruction even with a slight load. This poses a serious risk to your reputation as a manufacturer. In this regard, when choosing a fiber, it is necessary to pay attention to the presence of a certificate of conformity, quality passport and sanitary epidemiological. conclusions. Against the background of all this, basalt fiber has a number of significant advantages, ranging from price and physical and technical characteristics to the fact that it is difficult to fake it. All products of the company require documents confirming the quality of the goods, in addition, all materials are sold at the price of manufacturers, since we are their official dealers and have significant preferences in the purchase - our prices are among the lowest on the market.

The use of basalt fiber is one of the progressive trends in construction and industry of the 21st century.

At present, the limiting factors in the process of introducing reinforcement of cement, reinforced concrete and other types of products with fibers (glass, polymer, metal) are the low chemical resistance of glass fibers in the environment of hardening cement dough, the high cost of synthetic fibers with their low efficiency, shortage and a number of disadvantages (corrosion, worse adhesion to cement, different coefficient of expansion with concrete, which contributes to cracking of concrete under conditions of a significant temperature difference, 7 times the weight of metal fiber, worse technological characteristics) of metal fiber. Of all the variety of materials used for the production of fiber, only carbon fiber can compete with basalt fiber in terms of its mechanical, chemical and thermal characteristics, but the latter is 14 times more expensive. Basalt fiber is an effective micro-reinforcing additive in concrete, other cement-based or gypsum-based mortars. First of all, it increases the resistance of concrete to deformation without destruction during the critical period of 2-6 hours after laying. At a later stage, when the concrete has hardened and begins to shrink, the basalt fibers prevent the concrete from cracking, thus significantly reducing the risk of breakage, and therefore reducing the amount of scrap. In small-piece decorative products made of cement or gypsum, basalt fiber reduces the amount of defective products by 90-100%. The use of basalt fiber in concrete mortars eliminates the formation of shrinkage cracks at an early stage by 90%, for comparison, the use of reinforcing mesh reduces by only 6% (when concrete shrinks, the steel mesh undergoes compression and increases tensile stresses in concrete). But basalt fiber cannot be used as a replacement for structural steel reinforcement in monolithic housing construction, it is permissible to use basalt-plastic reinforcement here (see the article on composite reinforcement). The use of basalt fiber makes it possible to reduce the hydration of concrete, thereby reducing internal loads during temperature fluctuations. Basalt fiber is effectively used when working with the installation of fiber-reinforced concrete floors, in the production of foam concrete, to prevent cracking of concrete and gypsum products, it has proven itself well in paving slabs, concrete fences, aerated concrete and other cellular concrete, sand concrete, architectural and decorative printed concrete, in shotcrete, etc. etc. With basalt fiber, many plastering and other finishing works are also simplified. It is promising to use in the manufacture of gypsum boards, the strength of which increases, thereby reducing its fragility and rejection (including during transportation). Basalt fiber is especially widely and advantageously used in the construction of hydraulic structures - reservoirs, settling ponds, weirs, ports, docks, roads, sea barriers, as well as concrete roads and bridges, where increased resistance to the penetration of anti-icing salts is especially important. Basalt fiber is very popular among manufacturers of foam blocks and other blocks made of cellular concrete. In the production and transportation of foam blocks with the addition of fiber, the amount of rejects is significantly reduced and the quality of the goods is improved. The experience of using basalt fiber has shown that when adding 1 kg of basalt fiber per 1 cubic meter of concrete, the reject rate is practically zero, namely: there are no chips at the corners and edges, the bending strength increases by 2-5 times and compression by 50%, except In addition, heat and sound insulation properties increase. At a dosage of 2 kg of basalt fiber per 1 meter of cubic

concrete, seismic resistance appears. Another important point is that basalt fiber reduces the time of primary and final hardening of foam blocks and, as a result, allows you to speed up the turnover of forms, and when using the cutting technology for the production of foam concrete, significantly reduce the time interval from pouring to cutting the foam concrete mass, which means - overall increase plant productivity by 50%. It is also interesting that basalt fiber can reduce cement consumption by up to 8% while maintaining the same technical characteristics of finished products. Basalt fiber is absolutely resistant to all chemicals that make up concrete, physical damage during mixing, to alkalis used in production processes, heat-resistant, does not corrode (which is typical for steel fiber), easily spreads without forming clumps, even when added to already poured mixture, durable, compatible with any additives and additives in concrete, including plasticizers, antifreeze additives, hardening accelerators and setting retarders.

Basalt Fiber

Basalt fibers are fibers whose introduction increases the tensile strength of concrete, which has a number of advantages over synthetic fibers, since it is one of the strongest mineral fibers known to mankind. Comprehensive studies and conclusions of leading domestic and foreign laboratories give grounds to assert with full confidence that basalt fiber is able to completely change the idea of construction in general.

Technical Parameters:

• Base material: basalt;

• Color: bronze;

• Density: 2.8 g/cm3;
• Individual fiber diameter: 13-20 microns;
• Fiber length: 3,6,13,15,18,24,27,30 mm, possibly 40, 50 mm (no longer appropriate due to loss of concrete strength);
• Fiber type: monofilament;
• Shape: individual fibers collected in temporary bundles;
• Line density: up to 480 dtex;
• Tensile strength: 45-55 gs/tex;
• Stretch ratio: 4.5-8%;
• Operating temperature: from -260 to + 700 °C;
• Temperature of short-term extreme operation: 900 °C;
• Melting point: 1450.°C;
• Resistance to acids and alkalis: stable;
• Surface: Promotes uniform dispersion and adhesion to the cement slurry

Some of the applications of basalt fiber

Fiber should be used in all types of gypsum and cement-containing mortars, where micro-reinforcement is necessary or desirable, as well as the prevention of shrinkage cracks, for concrete coatings (both external and internal). Fibers typically find use in concrete for:

• production of foam concrete, aerated concrete, polystyrene concrete, etc.;
• devices of concrete self-leveling floors (both industrial and domestic);
• devices for cement-sand floor screed;
• arrangement of floors of industrial warehouses bearing heavy loads;
• hydraulic structures (lighthouses, coastal fortifications, bridges, dams, reservoirs, concrete water channels);
• outdoor areas, parking lots, strengthening of slopes;
• coating of metal surfaces of steel structures;
• concrete floor slabs;
• in structures with a high degree of fire safety;
• military installations;
• internal reinforcement of tunnels and channels;
• objects of the petrochemical industry;
• monolithic structures;
• concrete foundation slabs;

• reinforced concrete piles;
• repair and reconstruction of structures;
• extruded and molded products;
• mortars, dry mixes and plasters;
• shotcrete;
• printed decorative concrete;
• places of increased seismic activity;
• production of paving slabs, etc.;
• casting of small architectural forms from concrete or plaster;
• friction materials for the automotive industry;
• composite materials for the automotive industry;
• needle-punched non-woven materials for thermal insulation and refractory;
• production of basalt plastics

Conclusion

All of the above indicates that now the construction industry is on the verge of a period of active use of basalt fiber-reinforced concrete, not only in foreign, but also in domestic civil, transport, hydraulic engineering and other areas of construction, especially since the regulatory documentation and research results on basalt fiber-reinforced concrete are already available.

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