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Prospects for the use of Polymer Composite Reinforcement in the Reinforcement of Concrete Structures in the Republic of Uzbekistan

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ABSTRACT: This article presents the advantages and disadvantages of using composite reinforcement in construction in comparison with traditional steel reinforcement.

KEYWORD: composite and steel reinforcement, construction, basalt fiber.

The volume of construction and beautification works in the Republic of Uzbekistan is growing year by year. Successful implementation of the planned large-scale construction work requires the widespread use of new innovative technologies. The introduction of polymer composite fittings in the construction practice in the conditions of Uzbekistan requires their study in the conditions of our country. Therefore, research in the field of reinforcement of reinforced concrete structures with polymer composite reinforcement is an urgent problem of social and economic significance.

In the development of the economy of the Republic of Uzbekistan, in improving its material and technical base, it is important to put into practice on the basis of theoretical research elements that have a new constructive solution and are cost-effective.

In recent years, the President of the Republic of Uzbekistan and the Cabinet of Ministers have been making important decisions to improve the living standards and living standards of the people. Implementation of these decisions requires the creation and practical application of economically inexpensive building structures with high durability, originality in the construction of industrial enterprises, residential buildings, engineering structures, which are necessary for the economy. The issues raised in this direction receive composite materials that are relevant today in terms of their scope. The use of composite materials in construction increases the overall reliability, technical and economic efficiency of manufacturing, residential, public buildings and engineering structures for the reception of permanent, temporary and seismic stresses.

The use of flexible elements reinforced with composite reinforcement in industrial, residential, public buildings and engineering structures requires a scientific basis based on a new theory, confirmed by the results of experimental studies. Appropriate recommendations and practical solutions should be developed on the basis of scientific research.

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In modern construction, composite polymer materials are gaining an increasingly strong position as an alternative to existing structures . Currently, the market performance of polymer composite materials is growing, and the polymer-composite materials sector (PKMS) is about 60 billion euros, with a global production volume of more than 8 million tons [1].

Demand for reinforced concrete elements and elements reinforced with composite reinforcement in the Republic of Uzbekistan is 0.2-0.8% of total polymer composites

Interstate standard for reinforcement of structures GOST 31938-2012 «Composite polymer reinforcement for reinforcement of concrete structures. It is required to accept the following types of composite fittings that meet the requirements of "General technical conditions" (approved by the State Architectural Construction of the Republic of Uzbekistan on August 14, 2014):

glass composite (SHKA);

basalt composite (BKA);

carbon composite (UKA).

Composite fittings have the following nominal diameters: 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 22, 25 mm.

Composite polymer of nominal diameter is used in the calculation of physical and mechanical characteristics of reinforcement and concrete structures reinforced with this reinforcement.

Plastic glass fittings are a product that replaces steel fittings.

Composite polymer fittings (KPA) play an important role in composite materials . KPA is a reinforced rod made of continuous reinforcing roving and thermoactive resin. In foreign literature, the term "Fiber reinforced polymer rebar (FRP-rebar)" can be found.

The creation of the KPA is practically the result of the rapid development of the chemical industry. It is noted that in a number of countries (former USSR, Germany, Japan, USA, Netherlands, etc.) in the 60s of the XX century began research work on the construction of composite polymer fittings.

In the creation of the KPA in the USSR A.A. Gvozdev, K.V. Mixaylov [3], N.A. Moshchanskiy [4], O.Ya. Berg [5], N.P. Frolov [6-8], Vildavskiy Dyugai [9], Aslanova L.G. [10] have been successful in their scientific work.

The authors have developed a technology for the production of glass fittings by pultrusion, studied various polymers for the production of KPA, studied the effects of abrasive environment on glass fibers.

KPA production has been stalled for a long time due to a lack of quality raw materials and the difficulty of finding them, but in the last 10-15 years the situation has changed for the better. Types of fibers that can be found have emerged. In construction, there is a need for structures and elements made of KPA. These needs have arisen in the protection of steel reinforcement from erosion, in the reinforcement of concrete structures used in highly corrosive environments, and in the use of structures with diomagnetic and dielectric properties in buildings and structures.

The factors cited in the study of the properties of KPA require the updating of previous scientific research, improvement of production technology, development of scientific and technical documentation.

Today in the Republic of Uzbekistan KPA products are the first in Uzbekistan " URAL-ASIA ARMATURA" , one of the manufacturers of plastic glass fittings.

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This is the first plant in Uzbekistan to produce basalt fittings. The total area of the plant, which employs 200 people, is 10,000 square meters. This plant has a production capacity of 3,000 tons of basalt fiber per year. Since February 2018, the plant has produced 720 tons of fittings. This plant is located in the village of Yangi Bazar, Yukori Chirchik district, Tashkent region.

SNQ 2.03.14-18 [11] was developed and implemented by the Ministry of Construction of the Republic of Uzbekistan for concrete structures based on KPA.

In the Republic of Uzbekistan, more than 20 patents have been obtained for devices for technical solutions for the use of composite fittings in building structures and elements.

According to the factors given in GOST 31938 [34] in relation to the type of filler reinforcing fiber, KPA is divided into the following types:

- ASK - fiberglass fittings;
- ABK - basalt fiber reinforcement;
- AUK - carbon fiber armature;
- AAK - aramid fiber reinforcement;
- ACK - combined fiber reinforcement.

ACC is included in the standard of our country on the basis of normative documents of foreign countries.

It is expedient to classify KPA by profile appearance, as this factor depends on the description of the performance of KPA in concrete. [15,20]

The analysis of the properties of KPAs shows that they are an effective alternative to steel reinforcement, which is resistant to abrasion along with having strength properties. The properties of KPAs and their cost depend primarily on the filler fibers used in them.

Analysis of the research work carried out requires new scientific research on the application of new types of KPA in building structures and elements, a comprehensive approach to their stress and deformation conditions, characteristics of all types of use and cost-effectiveness.

Used in concrete structures instead of traditional steel reinforcement. It is made of glass, carbon fiber and basalt steel. Its appearance does not differ from traditional fittings, it is a construction product that can be produced in any length, with a continuous spiral relief, with an outer diameter of 4 mm to 16 mm.

Composite plastic glass fittings are an environmentally safe construction product. It is far superior to steel fittings in terms of durability and almost all indicators.

Plastic fittings can be stored in a variety of environments. Because it is lightweight, it can also be carried in light vehicles. This armature features glass-saturated glass.

Plastic fittings are also called polymer or composite. Advantages of plastic fittings:

With respect to steel

- 2.5 times stronger;
- 10 times lighter;
- 30% cheaper, which in turn reduces construction costs;

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- Easy to transport;
- Stainless, calculated service life is 80 years.

Where to use:

- Reinforced concrete products (in the construction of bridges, foundations, floors, garages, corridors, highways and roads);
- In the construction of barriers;
- In strengthening the banks of reservoirs;
- In foundation repair works, brick and reinforced concrete structures;
- As elastic ties;
- In the construction of marine and port facilities;
- On road and sidewalk slabs;

It is advisable to conduct new experimental studies. As a result, specific areas of application of composite fittings in the conditions of our country will be identified, clear results will be obtained on their calculation and design, practical recommendations on production (production) will be issued.

Conclusion :

Today, the possibilities of improving the technology of production of composite fittings, improving the properties of raw materials, the use of composite fittings in the construction of load-bearing structures of buildings and structures under construction in Uzbekistan are identified and significant economic efficiency is achieved. Based on many years of research and experience, their implementation is summarized.

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