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## FEATURES OF THE FIBERGLASS USAGE IN THE FINISHING OF FACADES OF RESIDENTIAL BUILDINGS

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**Keywords:** facade, decorative element, polymer, composite material.

**Abstract.** The article provides information on the use of polymer composite materials in the decorative design of facades in residential capital construction, lists the physical and mechanical characteristics that require consideration, advantages and disadvantages, as well as the difficulties and problems that arise in the process of production and installation of products from them.

## ОСОБЕННОСТИ ИСПОЛЬЗОВАНИЯ СТЕКЛОПЛАСТИКОВ В ОТДЕЛКЕ ФАСАДОВ ЖИЛЫХ ДОМОВ

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**Ключевые слова:** фасад, декоративный элемент, полимер, композиционный материал.

**Аннотация.** В статье приводится информация о применении полимерных композиционных материалов при декоративном оформлении фасадов в жилом капитальном строительстве, перечисляются требующие учета физико-механические характеристики, достоинства и недостатки, а также сложности и проблемы, которые возникают в процессе производства и монтажа изделий из них.

Currently, the residential construction market is very competitive. In order to meet the high demands of customers and conduct successful sales, developers are striving to implement new generation real estate projects. In order for the project to become an event on the market and stand out from the general mass of tasteless and lurid buildings, it is necessary to find a new approach to decorating facades and find interesting and eye-catching materials [1].

As practice shows, the experience of using polymer composite materials in architecture is poorly represented. Developers with new building materials are very reluctant to work. This is mainly due to the lack of a regulatory framework. However, an important factor is that a few specialists who are engaged in design do not have the necessary knowledge to introduce innovative materials and technologies into the projects they implement [2].

Now days on the market there is a wide range of materials that allow you to create almost any architectural appearance for a residential building [3].

However, the facade decoration elements give a truly unique look. Modern technologies provide architects and marketers with great opportunities for creativity and the realization of their fantasies.

Glass fiber reinforced concrete, polymer concrete, foam plastic (polystyrene), fiberglass:

- all these are materials that can be used for the manufacture of decorative elements of the facade, such as bas-reliefs, columns, balusters, rosettes, cornices, panels, pilasters, etc. The listed materials (with the exception of polystyrene) are a polymer matrix (organic or inorganic nature), which is reinforced with a wide variety of fillers, depending on the purpose of the material. The matrix performs the function of a link, while the reinforcement provides the necessary physical parameters [4]. Of all the above, I would like to single out fiberglass separately in connection with the following such advantages as:

- high strength, comparable with metals;
- light weight (specific gravity: fiberglass –  $1.8 \text{ g/cm}^3$ , A97 aluminum –  $2.71 \text{ g/cm}^3$ , steel –  $7.8 \text{ g/cm}^3$ );
- high chemical and UV resistance;
- vandal resistance, the ability to repair and restore gelcoat surfaces of fiberglass;
- relatively good fire resistance (TG, G1), low emission of smoke (D1..D2) and toxic substances (T2), self-extinguishing;
- the possibility of staining in any color and shade both superficially and in bulk;
- the ability to implement various visual effects on the surface and its structure.

All the above allows us to talk about fiberglass as a very promising structural material that is able to meet all the requirements for building facade finishing materials: withstand the necessary loads, have high strength and load-bearing capacity, good fire, ozone and frost resistance, low density and moisture absorption, etc [5].

The disadvantages of fiberglass should include the following two factors that require consideration [6].

The first factor is the relatively high cost of the material components, which hinders the choice of fiberglass as a facade finishing material.

Indeed, when comparing the price of fiberglass with fiberglass concrete and polymer concrete, the latter are in a significantly more advantageous position [7]. However, when performing a feasibility study, taking into account the design features, design intent and the cost of storage, installation and operation, the cost of fiberglass is comparable to the cost of polymer concrete and only slightly higher than fiberglass concrete [8].

Thus, significant savings at the stage of construction and installation work is achieved due to the higher manufacturability of work: the installation of decorative materials takes less time and does not require the involvement of special equipment. Compared to other materials, fiberglass additionally allows not only to reduce the

load on the facade system (due to the possibility of manufacturing thin-walled molded elements), but also to reduce transportation costs upon delivery to the construction site. Another important property of fiberglass is its high resistance to cracking and chipping, which minimizes damage during transportation, and, in addition, makes it possible to manufacture vandal-resistant and maintainable structures [9].

The second factor hindering the freer introduction of fiberglass in design practice is the lack of relevant technical documentation for materials, namely the Technical Certificate and the technical conformity assessment in construction, which are necessary for the facade system to receive mandatory certification at the Federal Center for Rationing and Standardization. Currently, the use of fiberglass in the design of facades of multi-storey residential buildings is limited only by their fire resistance class G1 (with the required G0). Even though the glass-reinforced plastics are not combustible materials, the presence of organic substances in their composition, even in small quantities, inevitably classifies them as materials that are limitedly suitable for use on facades, which must be taken into account when designing [10].

### **Conclusions**

As a result, it can be noted that glass-reinforced plastics are structural materials, the use of which for finishing the facades of modern buildings is very promising. They can be successfully used to replace such traditional materials as concrete and fiber-reinforced concrete, being in no way inferior to them, and even surpassing them in some parameters. So, fiberglass, having a small mass and high strength, allows installation work to be carried out in a shorter time; high mechanical strength ensures minimization of losses associated with the appearance of chips and cracks on products; high chemical and atmospheric resistance guarantees a long service life, and the ability to self-clean - technological maintenance, etc. The unique properties of fiberglass favorably distinguish them from the general range of materials used in residential construction. The factor that needs to be taken into account in the design is the restriction for the material in terms of fire resistance class (not higher than G1). However, practice shows that the use of modern materials and technologies can take into account or even remove this limitation. The development of the necessary technical certificates and technical evaluation, obtaining permission for use in hinged facade systems will open up immense opportunities for the use of fiberglass in design and construction.

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