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**THE USE OF HIGH-GRADE REINFORCEMENT IN PRECAST-MONOLITHIC REINFORCED CONCRETE STRUCTURES.**

**Abstract.** Reinforced concrete structures occupy an important place in the construction industry due to their excellent performance characteristics, such as high strength, durability, fire resistance and versatility. One of the main factors affecting their quality and safety is reinforcement, which provides concrete with compressive strength and resistance to tensile forces. In recent decades, high-class reinforcement has been actively used in construction, which allows for the creation of more reliable and cost-effective structures. This article discusses the use of high-class reinforcement in precast-monolithic reinforced concrete structures, as well as its impact on the strength characteristics and durability of structures.

**Keywords:** Precast concrete, monolithic structures, high-class reinforcement, durability, stability,

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# ИСПОЛЬЗОВАНИЕ ВЫСОКОКЛАССНОГО АРМИРОВАНИЯ В СТЕНОВЫХ МОНОЛИТНЫХ ЖЕЛЕЗОБЕТОННЫХ КОНСТРУКЦИЯХ

**Аннотация.** Железобетонные конструкции занимают важное место в строительной отрасли благодаря своим отличным эксплуатационным характеристикам, таким как высокая прочность, долговечность, огнестойкость и универсальность. Одним из основных факторов, влияющих на их качество и безопасность, является армирование, которое придаёт бетону прочность на сжатие и сопротивление растягивающим силам. В последние десятилетия активно используется высококлассное армирование, что позволяет создавать более надёжные и экономически эффективные конструкции. В статье рассматривается использование высококлассного армирования в стеновых монолитных железобетонных конструкциях, а также его влияние на прочностные характеристики и долговечность конструкций.

**Ключевые слова:** сборный бетон, монолитные конструкции, высококлассное армирование, долговечность, устойчивость.

Reinforced concrete is a composite material consisting of concrete and reinforcement. Concrete effectively resists compression, but poorly absorbs tensile and bending loads, so reinforcement is used to increase strength and stability. Depending on the manufacturing method, there are two types of reinforced concrete structures:

Precast - structural elements are manufactured in factories and then transported to construction sites.

Monolithic - structural elements are poured directly at the construction site.

A combined option, when elements are manufactured both in the factory and during the pouring process on site, is called precast-monolithic. This approach

ensures high precision in the manufacture of elements, as well as optimizes construction time.

High-class reinforcement is steel reinforcement, which is characterized by high strength and resistance to loads. The main classes of reinforcement used in reinforced concrete structures include:

A240 and A400 - low and medium class reinforcement, used in standard designs.

At800 and At1200 are high-class reinforcement, designed to create highly loaded and critical structures.

However, in addition to the advantages, there are also several disadvantages associated with the use of high-grade reinforcement:

High cost - although savings on materials and transportation generally compensate for these costs, at the initial design stage the cost of reinforcement can be significant.

<b>Class of reinforcement or wire</b>	<b>Diameter range in millimeters</b>	<b>Tensile strength in N/mm<sup>2</sup></b>
A-I (A240)	6–40	373
A-II (A300)	10–40 and 40–80 depending on alloy grades	490
Ac-II (Ac300)	10–32	441
A-III (A400)	6–40 and 6–22 depending on steel grades	590
A-IV (A600)	10–18 и 10–32	883
A-V (A800)	10–32	1 030
A-VI (A1000)	10–22	1 230
At400C	6–40	550
At500C	6–40	600
At600, At600C and At600K	10–40	800

АТ800	10–32	1 000
АТ800К	18–32	1 000
АТ1000 and АТ1000К	10–32	1 250
АТ1200	10–32	1 450
Wire Vr-1	3–5	400 – 1085 depending on diameter
VR and V high-strength wire, corrugated and smooth	3–8	1470 – 1780 depending on diameter

Difficulties in processing and joining — high-class reinforcement, especially with higher tensile strengths, requires special conditions for welding and tying, which increases the labor intensity of the work.

#### Examples of the use of high-class reinforcement in construction

In recent years, high-class reinforcement has been actively used in the construction of large infrastructure facilities, such as bridges, tunnels, high-rise buildings and other structures where high loads and dynamic impact are critical. In particular, class A500C reinforcement is used to reinforce large precast and monolithic elements of buildings and structures, as well as for the construction of facilities with increased safety requirements.

The use of high-class reinforcement is especially important for structures in areas with different climatic conditions, where increased corrosion resistance and durability of structures play an important role.

High-class reinforcement in precast and monolithic reinforced concrete structures can significantly increase their strength, durability and cost-effectiveness. Using high-quality reinforcement, it is possible to optimize the design and reduce material costs, while ensuring the reliability and safety of structures. Despite the higher cost and complexity in processing, the use of high-

class reinforcement is a justified solution for the construction of facilities subject to increased loads and external factors.

Taking into account the growing requirements for the stability of construction projects and safety standards, the use of high-class reinforcement will continue to expand, ensuring the construction of more reliable and durable structures.

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