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Hydraulic Couplers and Their Attachments

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Abstract: This article details the importance of hydraulic fasteners, their types, physical and chemical properties and additives that increase technological efficiency, which occupy an important place in the system of building materials. The process of solidification of hydraulic couplers in the aquatic environment, their mechanisms of strength formation and their application in modern construction have been analyzed from a scientific point of view. Also based on the effect of mineral and chemical additives on the quality of binders, environmental and economic efficiency.

Keywords: hydraulic fasteners, cement, lime, mineral additives, chemical additives, hardening process, consistency, building materials.

Introduction. In the modern construction industry, the demand for materials with high strength, long-term service properties is increasing from year to year. It is the hydraulic couplers that are one of the main materials that satisfy these requirements. Hydraulic couplers are a group of inorganic substances that solidify in the presence of water and maintain their strength even in the aquatic environment.

The reliability, durability and operational properties of construction structures directly depend on the quality of the binders. Therefore, an in-depth study of hydraulic couplers, improving their composition and improving their technical performance with the help of various additives is an urgent scientific and practical issue.

The main purpose of this article is to systematically describe theoretical knowledge about hydraulic couplers and their additives, to reveal their place in construction practice.

Main part. General description of hydraulic couplers. Hydraulic couplers are materials that, when mixed with water, come into a plastic State and harden over time and retain their strength even in aquatic environments. Their main difference is that the hardening process proceeds not only in the air, but also under water.

Hydraulic couplers: solidify not only in the air, but also in the water. Examples include hydraulic lime, portlandsement, gully cement, putssolan cement, shallow portlandsement, expanding cements, etc.z when using Mineral spoilers, it is necessary to know the following: the thickening period of the mixture, the amount of water to obtain a normal mixture, the degree of coupling of water with the mixture, the amount of heat released in the thickening, etc.z. The time elapsed from mixing the binder with water to moving to the Stone state is called the period of its thickening. When there is a lot of water in the thickening, its thickening is slow. When preparing a mixture, you must first determine the amount of water. The amount of water for each binder is determined by the percentage calculation relative to its weight. When the binding material is mixed with water, it begins to thicken as a result of physicochemical processes, its excitability

decreases. This is called the beginning period of the binding agent thickening, and after the excitation is completely lost, the end of thickening(hardening). Depending on the period of thickening, the binders are divided into 3 groups. - fast thickening-the period of onset of thickening is 3-10 minutes. Since it is inconvenient to use such binders, special substances are added to it that weaken its thickening, for example, construction plaster; - normal thickening – the starting period of thickening lasts after 30 minutes, and at the end up to 12 hours. Such augers include concrete and all the cement that is commonly used in the making of blends. - slow thickening-binding items, the thickening of which begins after 12 hours. When preparing a Normal mixture, water is actually obtained more than the amount spent on the chemical attachment of the binder. Therefore, even after hardening the mixture, there will be a lot of free water in it, which is not attached in small tubes and pores. When the binding material is mixed with water, it begins to thicken as a result of physicochemical processes, its excitability decreases.

The binding mechanism is based on complex physicochemical processes, mainly caused by hydration reactions. As a result, crystal structures are formed, forming a solid structure.

Types of hydraulic couplers. Portlandsement is the most common hydraulic coupler. It is obtained by grinding clinker, plaster and, in some cases, mineral additives. Portlandsement is characterized by high strength, fast hardening and universal application.

Slag cements. It is obtained on the basis of granulated slag, which is the waste of the metallurgical industry. Such Cements are environmentally efficient and reduce energy consumption.

Hydraulic mortar. Hydraulic lime contains silicon and aluminum compounds and has the property of hardening when exposed to water. It is mainly used in restoration and historic restoration.

The hardening process of hydraulic couplers. Hydraulic couplers are substances that, when mixed with water, come into a plastic State and, over time, Harden both in air and in the aquatic environment, forming a solid artificial Stony material, since the process of solidification of hydraulic couplers is a complex process that is carried out on the basis of chemical reactions associated with water. Proper management of this process is important in ensuring the strength, long service life and quality of concrete and construction mixtures.

The hardening of hydraulic couplers consists of two main stages:

1.Initial hardening-compaction of plastic mass

2.Strengthening-development of crystal structures

During these processes, water plays an important role not only as a mixing medium, but also as a participant in a chemical reaction.

Attachments to hydraulic couplers. Attachments are used in order to improve the technical and operational characteristics of fasteners.

Mineral supplements

- The ashes of the moment
- Domna shlaki
- Microkremny

They reduce cement consumption and increase strength and durability.

Chemical additives

- The plasticizers
- Accelerators

- The slowers

These additives improve the processing comfort of the mixture and control the hardening time.

Economic and environmental importance of additives. Hydraulic systems are now widely used in industry, construction, transport and agriculture. The efficiency, reliability and long service life of these systems largely depend on hydraulic attachments. Hydraulic additives are special substances that are added to hydraulic fluids, which act to improve the performance characteristics of the system, reduce wear and protect against external influences. The economic and environmental importance of hydraulic additives is widely covered in this lecture

Economic importance of hydraulic additives. The economic importance of hydraulic additives is primarily due to the reduction of production costs. The following aspects are examples of this:

1. **Extend the service life of the equipment.** Additives reduce friction and eating of metal parts. As a result, the service life of pumps, valves and cylinders increases, and the need to replace them more often decreases.
2. **Reduction of repair and maintenance costs.** As hydraulic systems operate steadily, the number of accidents decreases. This saves time and funds for repairs.
3. Energy saving. Reduced friction reduces energy loss. As a result, electricity or fuel consumption is reduced, increasing overall production efficiency.
4. Increase production efficiency. Continuous and stable operation of the system ensures that production processes do not stagnate. This will serve an increase in the income of the enterprise.

The use of additives ensures energy efficiency, allows waste to be recycled, and reduces the negative impact on the environment. In particular, the use of industrial waste is consistent with the principles of sustainable development.

Conclusion. In conclusion, hydraulic couplers are an integral component of the modern construction industry. Their high strength, water resistance and universality are the reasons why they are widely used in the construction of various structures. And the rational use of additives further increases the quality indicators of binders, ensuring economic and environmental efficiency.

Hydraulic attachments are of great importance not only technically, but also from an economic and environmental point of view. They extend the service life of the equipment, reduce production costs, increase energy efficiency and serve to protect the environment. Therefore, in modern industry, the rational and correct use of hydraulic additives is one of the important tasks.

In the future, the improvement of hydraulic couplers, the creation of new additions and the introduction of environmentally friendly technologies will become one of the important directions of scientific research.

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