BITUMEN-POLYMER FUSED MEMBRANES

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Concrete structures in environments with adverse geomorphic and climatic conditions such as severe ground and ambient salinity and high temperature-humidity regimes are prone to early deterioration. Such aggressive environments induce several deterioration problems, and the most frequent and damaging one is the corrosion of reinforcing steel, which causes early deterioration of concrete structures. Several measures have been tried to combat this problem and extend the service life of concrete structures [1]. One such measure is the application of a waterproofing coating on the external surface of concrete structure. The main function of a waterproofing system is to prohibit water and any soluble salts from penetrating the concrete to cause corrosion, leaking, and other problems. In addition, waterproofing materials can be very effective in minimizing the rate of corrosion once it has initiated by preventing access of moisture and oxygen to the steel surface [2].

However, there are other methods that serve to enhance the effectiveness of waterproofing and eliminate possible leaks. Among the most convenient, technologically advanced, reliable and durable materials that have successfully proven themselves in operation, it is worth highlighting built-up bitumen-polymer roll materials.

Fused bitumen-polymer roll materials are a unique and modern construction waterproofing material that has a number of advantages and consists of bitumen, modifiers, a synthetic reinforcing base and a protective coating. This is a fairly durable material. It is highly resistant to ultraviolet radiation and ozone. Due to this, fused bitumen-polymer roll membranes have a long service life. If installation recommendations and operational requirements are followed, they can last from 10 to 60 years. The high resistance of raw materials to oxidation also has a positive effect on service life. Fused bitumen-polymer roll membranes retain flexibility at subzero temperatures down to -25°C, have higher heat resistance (up to +130°C) compared to other waterproofing materials and have increased adhesive properties. Reliable adhesion is an important characteristic for any coating. While it enhances strength and durability, it also protects against environmental influences.

Table 1

Physical and mechanical properties

Heat resistance, °C		>1
Flexibility at low temperatures, °C		<
Waterproof, кПа		

in 24 hours	>100
in 2 hours	>150
Vapor permeation resistance coefficient, μ	>20
Heat resistance, after thermal aging, °C	>1
Adhesion of granules, %	1
Flammability, class	G
Fire resistance, class	F

Advantages of fused bitumen polymer membranes:

1. The equipment used for installing waterproofing membranes is a burner and a gas bottle with propane

2. Welded waterproofing is more resistant to mechanical damage. Fused waterproofing materials have a self-tightening effect.

3. After the expiration of its service life, new waterproofing can be rolled up without dismantling the old coating.

4. It is possible to cover the roof with a minimum number of seams, thanks to the presence of wide rolls, the size of which ranges from 1 to 1.5 meters.

As a result, it can be said that fused bitumen-polymer membranes can ensure uniform distribution of vapor pressure in the compartment between its surface and the roof. In addition, it almost completely eliminates the possibility of bubbles, various cracks and unnecessary leaks. The composition of bitumen-polymer membranes consists of a specially developed mixture of bitumen and polymers. The main difference between the types of compounds is the type of polymer used:

One such polymer is APP polymer, which has remarkable properties that allow it to be used in the hottest climates. APP polymer provides high flow resistance, making it an excellent material for use in hot climates. However, it should be noted that during cold periods the material becomes less elastic and flexible, which is a certain limitation.

Another version of the polymer composition, which has its own set of unique properties, is SBS polymer. It provides additional flexibility and dynamic stability of the material. However, it should be noted that, unlike APP polymer, SBS polymer cannot be used in very hot climates as a membrane for closures, since it does not impart high flow resistance to the material.

However, to overcome this limitation, special anti-root additives can be added to the polymer-bitumen composition. These additives make the material resistant to root penetration and provide reliable waterproofing for green roofs and foundations. Thus, a material is created that has optimal characteristics for use in various climatic conditions.

References:

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