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TECHNICAL PRINCIPLES AND APPLICATIONS OF POLYMER WATERPROOF COATINGS

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Abstract. Polymer waterproof coatings generally refer to waterproof coatings made of synthetic resin emulsion as the basic film-forming material. As a kind of functional architectural coating, polymer waterproof coatings have been widely used in waterproofing projects of structural parts such as roofs, basements, kitchens and bathrooms, and exterior walls of buildings in recent years. Unlike general functional architectural coatings, waterproofing has almost become the main function and purpose of waterproof coatings, and the decorative function can even be ignored. For example, most waterproof coatings used on roofs have no requirements for decorative functions: the decorative function of waterproof coatings used on the exterior walls of basements is meaningless.
Keywords: waterproof, roofs, buildings, polymer, coating, elastic, mixing.

Introduction. The roof, bathroom, basement and other structural parts of buildings may be in water or affected by water for a long time, which is the main application of waterproof coatings. Therefore, the requirements for water resistance and waterproof performance of waterproof coatings must be very stringent. In addition, the temperature of some structural parts varies greatly, and their base is generally cement-based materials, and cracks caused by various reasons are very common.

As for the base material, that is, polymer emulsion (generally acrylic emulsion or styrene-acrylic emulsion), its coating film is easily deformed under the action of external force. After the external force is removed, the deformation disappears and returns to its original shape, that is, the coating film has good elasticity[2]. This type of emulsion is generally called elastic emulsion.

Figure 1. Polymers

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Polymer emulsion is usually a thermoplastic resin. Its film-forming mechanism is that above the film-forming temperature of the emulsion, water evaporates, and the polymer particles condense and deform to fuse into one. When the temperature is higher than Tg, the polymer is in an elastic state, the coating also shows a certain flexibility, and has a certain elongation and elastic recovery performance. However, when the temperature is high to a certain extent, since this type of polymer has no chemical reaction during the film formation process, the polymer may be in a viscous flow state, the coating becomes sticky, and the various properties of the coating drop sharply[3].

Elastic emulsion is not the case. Although elastic emulsion is a type of high molecular polymer, its properties related to the glass transition temperature also follow the rules of general high molecular polymers. cost.

Figure 2. Polymer pigment

In polymer-modified cement waterproof materials, there are two ways to combine polymer and cement: one is physical combination, that is, the polymer film is covered on the surface of cement gel or cement hydrate is filled between the polymer network, and organic and inorganic substances are only inert and mechanically filled with each other; the other is chemical combination between polymer and cement. Polymers containing functional groups such as COOH can react with Ca2+ in cement hydration products, thereby significantly improving the strength and water resistance of the material, so this type of material is called reactive polymer cement-based material (RPMC) abroad. RPMC is made of active polymer, cement, initiator system and aggregate. The difference from the commonly used polymer modified cement material is that both polymer and cement play an active (reactive) role in the formation of the structure of the composite material.

Conclusion

Due to the chemical bonding between the polymer and cement interface, the bearing capacity of the interface is improved, thereby improving the interface toughness and fracture energy, resulting in good physical and mechanical properties[5]. After mixing, the polymer modified cement waterproof coating becomes a composite system composed of cement, polymer emulsion and filler. In the film-forming process of this system, for ordinary polymer emulsion, cement undergoes hydration reaction due to the water in the

polymer, forming a certain amount of cement gel: polymer particles in the emulsion disperse into the slurry, adsorb on the cement and cement hydration products, fillers, and pigment surfaces. With the consumption and loss of water, polymer particles gradually move closer to each other, and finally condense together, and bond hydrated and unhydrated cement particles, fillers, pigments, and base layers to form a coating.

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