A Novel Design of Thermal Insulation Energy-Saving Coatings for Exterior Wall

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Abstract

Thermal insulation coating can effectively prevent solar radiation into the coating and substrate in the zero-energy consumption situation, thus leading to improved working conditions and reduce energy consumption. This paper aims to design a kind of high performance thin layer of energy-saving thermal insulation coatings for exterior wall. Two or more thermal insulation mechanisms work together in the process of light and heat transfer, leading to the excellent performance of coatings, such as low thermal conductivity, good insulation effect, high reflectivity and high emissivity, and so on. Based on the principle of light and heat transfer of coating, a kind of optimized structural model of thermal insulation coating was proposed and designed, namely, double insulation system. The top-coat used the reflection-insulation type thermal insulation coating to form reflection-insulation layer, and the intermediate coating used the radiation-insulation type thermal insulation coating to form radiation-insulation layer. The double system has advantages of good insulation effect, easy to brush, saving resources, reducing energy consumption, etc; Considering the optical and heat transfer effect of coating, some issues were designed and explained such as the pigment particle size, the arrangement of filler and the coating thickness.