



IMPROVING THE DURABILITY OF MACHINE-BUILDING COMPOSITE POLYMERIC AND PAINT-AND-LACQUER MATERIALS AND COATINGS BY LOWERING INTERNAL STRESSES AND DEVELOPING A TECHNOLOGY FOR THEIR PRODUCTION

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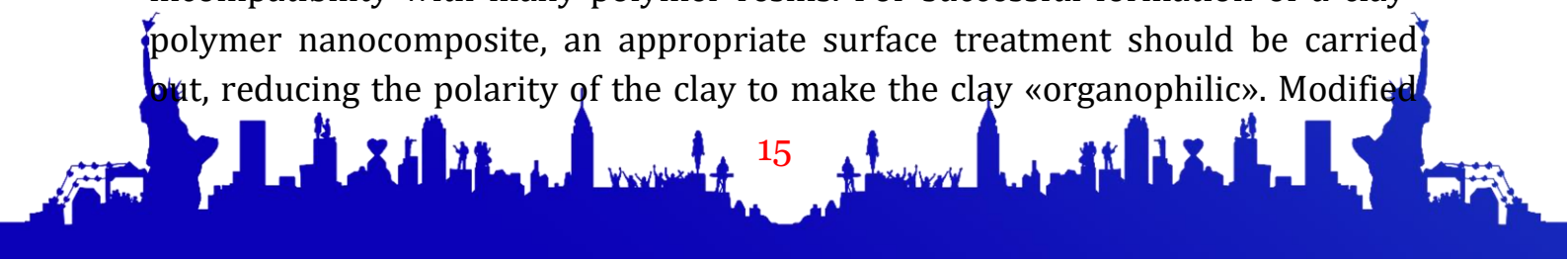
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Abstract. The proposed organomineral additives are novel, eco- friendly components for polystyrene paints. A light brown-red loam was used as a filler for polystyrene paints. Rheological, technological and physico-mechanical properties of paints and coatings based on them were studied by a series of standard tests. Characteristics of frost and water resistance, hiding power and holding capacity of polystyrene paint confirmed the creation of durable paints with high performance properties. Comprehensive studies have shown that the addition of organic additives in the composition of polystyrene paint increases the critical volume concentration of pigment 1.2 times, increases the degree of grinding paint, reduces dispersion time (2 times) and reduces the speed of shelter from 160 to 112 g / m². Analysis of the results of experiments showed that the addition of organic additives contributes to increased resistance to external influences, as well as the strength of adhesion to the substrate by 22 %. Using the obtained results will allow you to create polystyrene paints with a low content of volatile compounds and increased crack resistance.

Keywords: buildings, construction, facades, organomineral additive, polystyrene paint, clay, volatile organic compounds

Introduction Nanomaterials (pigments, additives) are effective in all types of coatings (organic, water-dispersed, powder). In the case of polymer nanocomposites, nanoparticulate substances are introduced into the polymer matrix. The role of such substances can be performed by organoclays obtained by modifying montmorillonite clays with an organic additive. The chemical composition of clay causes the presence of inorganic cations on the surface of the plates, giving the surface high hydrophilicity and, accordingly, incompatibility with many polymer resins. For successful formation of a clay-polymer nanocomposite, an appropriate surface treatment should be carried out, reducing the polarity of the clay to make the clay «organophilic». Modified





clay (organoclay) has several advantages over simple clay: organoclays are well dispersed in the polymer matrix and interact with the polymer chain. The addition of organoclay into the polymer matrix contributes to the improvement of the mechanical properties of polymers and thermal stability. This is achieved by combining the complex properties of organic (lightness, flexibility, plasticity) and inorganic (strength, heat resistance, chemical resistance) materials.

Every year more and more stringent requirements are imposed on paints and coatings based on them in connection with the advent of new technologies in industry, construction and the formation of modern aesthetic tastes at the consumer. This applies to both the protective and decorative properties of coatings, which are determined by the physicochemical parameters of all components of the paintwork formulation. In recent years, the demand for high-quality products, characterized by increased durability and lower consumption per unit of the painted area, has increased. At the beginning of 21-nd century, three factors had a significant influence on the main directions of development of the global paint industry. First, the tightening of environmental legislation on the content of volatile organic compounds (VOC) in paint and varnish products. Secondly, it is the search for substitutes for traditional paints and varnishes, which use organic solvents as a basis (mainly solvents and white spirit, as well as drying oil). Thirdly - the economic factor acting in full force in connection with the tightening of environmental legislation. Its action led to a resurgence of interest in the use of powder paints. Trends in the development of materials move in the direction of minimizing the solvent content in paint systems, while achieving professional quality that meets all environmental requirements. The advantages of such paints include, first of all, the possibility of their use at low temperatures, which can significantly increase the seasonality of the finishing works. This group of paints is characterized by the formation of a durable and well adhered to a variety of substrates protective film with high rates of frost resistance.

Especially attractive for the use of polystyrene in the paint industry is the comparative cheapness of this polymer, which is associated with the availability of raw materials, simple manufacturing technology, valuable properties. Despite the advantages of polystyrene, it is extremely limited in the paint industry. One of the reasons is its high brittleness temperature, which is 90 °C and is almost close to the glass transition temperature of the polymer. In this regard, the difference between the lower and upper boundaries of the temperature range of





operation of the coatings is small, which can cause their cracking at low temperatures.

Conclusion In order to analyse the occurrence of internal stresses and develop a new method and installations, below are the results of studying and analysing the occurrence of internal stresses and existing methods, instruments and installations for determining internal stresses in polymer and paint coatings.

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