DETERMINATION OF FLAME-RETARDANT EFFICIENCY CONSERVATION TERM OF THERMO-FOAMING FLAME-RETARDANT PAINTS

Key words: endurance period, fire retardants, fire-retardant efficiency, activation energy

Conservation term of flame-retardant efficiency or long-term strength of flame-retardants is a fundamental property that is characterized by the duration of conservation of flame-retardant, physical-mechanical and aesthetic properties. Determination of safe service life of thermo-foaming flame-retardant paints is one of the most actual problems in the assessment of their quality in relation to the observed increase in the number of non-compliance events of coatings to the warranty periods due to lower of their flame-retardant properties in time.

Modern flame retardants are represented by inorganic complex systems (based on silicates, phosphates, etc.) and by organic complex systems (chloroparaffins, amides, amidines, amines, etc.) components with varying degrees of polymerization. The compositions may comprise swelling agents, film-forming binders, solvents, pigments, fillers and other components. As the binders amino acids, halogenated rubbers, organic binders (linseed oil, bitumen), synthetic and modified natural polymers are used. To improve physical properties of the film and to give it plasticity plasticizers (glycerol, pentachlordiphenyl, chloroparaffins, tricresy1 phosphate, alkyl diphenylphosphate, etc.) are added in flame-retardant paints formulations. Mineral suspensions (oxides of lead, zinc, titanium, aluminum compounds, etc.) as pigments are used.
Flame retardants have a wide range of components having different chemical nature and differ significantly in properties. Every component that has a complex of specific properties reacts differently to the action of various external factors. Flame-retardant paints, as a rule, represent a mechanical mixture, the weatherproof properties of which are determined not only by individual properties of each mixture component, but also by complex of new properties acquired by the flame retardant compositions by mixing of organic and inorganic compounds in various proportions.

Therefore, one of the most actual problems by assessing of flame-retardant materials quality is to determine the duration of their warranty service.

Theoretical method for determining of the durability is hard to apply to existing flame-retardant materials with complex composition and gives a big error and requires sophisticated equipment to determine the coefficients. There is a limit on the temperature value by durability test of flame retardants, so that some used for swelling components have a sufficiently low decomposition temperature. Therefore, currently experimental techniques are used. The essence of these techniques is in reproduction under artificial external factors conditions with a certain intensity and duration. Changes of the coatings properties in these extreme conditions make it possible to predict the durability of coatings under natural conditions.

Our Institute has developed and tested methods of experimental determination of resistance to aging of flame-retardant coatings for wood, wood materials and metal, and has determined shelf life of flame-retardant efficiency of impregnating compositions for wood and flame-retardant wood strength. These techniques were included in the basis of standard STB 11.03.02-2010 “Fire safety standards system. Flame-retardant means. General requirements and test methods”.

On developed methods researches of thermo-foaming flame retardant paints for wood, wood materials and metal structures were made to determine shelf life of flame-retardant efficiency. Obtained research results allowed to spread the field of application of fire-retardant thermo-foaming paints, to improve the quality and aesthetic level of design solutions, as well as cost of construction and repairs.

REFERENCES

The article defines the endurance period of fire protection efficacy as one of the most important characteristics for quality assessment of fire retardants. Experimental methods for determination of endurance period of fire protection efficacy for fire retardant coatings and endurance period of fire protection efficacy for impregnating compounds as well as endurance of fireproof wood are given. It is shown that modern fire retardant compounds represent complicated systems of non-organic and organic components and because of that the existing express methods for determination of endurance period of fire protection efficacy for paint coatings are not suitable for that. Endurance period of fire protection efficacy under natural conditions can be predicted by reproduction under simulated conditions of external factors with certain intensity and duration.