Influence of the composition of gas-coke-forming systems on the fire-thermo-insulating properties of expandable composites

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The need for fire-thermo-insulating means that prevent the spread of fire through inter-storey polymer communications in the building sector is an incentive for the development of polymer thermo-foaming composite materials for fire-fighting preventive devices [1].

In order to obtain efficient economical thermally expandable composites (TECs) based on ethylene-vinyl acetate copolymer, a comparative study of the effect of the qualitative and quantitative composition of combustion retarders and inert mineral fillers on the thermal, physical-mechanical properties and fire-thermo-insulating ability of TECs was carried out.

It has been established that thermally split graphite (TSG) and / or a mixture "TSG–gas–coke–forming fire retardant system" provide the effect on increasing the efficiency of the fire-thermally insulating action of the silicate mineral filler. In the absence of a gas–coke–forming system (amine, metal- and / or phosphorus-containing compound), a comparable result in terms of fire resistance was obtained only in the case of a high filling of the composition with a silicate mineral. At the same time, a high content of heat-resistant mineral fillers (40–50%) in the absence of a fire-retardant system in the composition formulation leads to a decrease in the elasticity of the starting material and the strength of the thermally foamed coke residue. It has been shown that a set of satisfactory characteristics of TECs in terms of the required parameters (elasticity, foaming coefficient, mechanical strength of coke residue, total exothermic effect of DSC, flammability group, fire resistance limit) can be achieved by regulating the composition of the gas-coke-forming system and the ratio between the filler components.

References

[1] A.N. Garashchenko, A.A. Berlin, A.A. Kulkov. Fire and explosion safety (2019) 28 (2): 9.