

## Effects of Flame Retardant Nano Bio-Filler on the Fire Behaviour of Thin Film Intumescent Coatings

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**Abstract :** This paper analyzes the fire protection performance, char formation and heat release characteristics of the thin film intumescent coatings that incorporate waste eggshell (ES) as a nano bio-filler. In this study, the Bunsen burner and the fire propagation (BS 476: Part 6) tests of coatings were measured. Experiments on the samples were also tested to evaluate their fire behavior using a cone calorimeter according to ISO 5660-1 specifications. On exposure, the samples B, C and D had been certified to be Class 0 due to the fire propagation indexes of the samples were less than 12. Samples B and D showed a significant reduction in total heat rate (B=11.6 MJ/m<sup>2</sup> and D=12.0 MJ/m<sup>2</sup>) and uniform char structures with the addition of 3.30 wt.% and 2.75 wt.% ES nano bio-filler, respectively. As a result, ES nano bio-filler composition good to slow down the fire expanding and demonstrate better fire protection due to its positive synergistic effect with flame retardant ingredients on physical and chemical reactions in fire protection.

**Keywords :** cone calorimeter, eggshell, fire protection, heat release rate, intumescent coating

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