OVERPAINTING OF INTUMESCENT SEALS

IFSA FACT SHEET 03: INTUMESCENTS

Introduction

A very common request to IFSA is for advice concerning the advisability or otherwise of overpainting intumescent seals during refurbishment or redecoration projects.

This Fact Sheet considers the different types of intumescent material and the effect of overpainting on their performance.

High Pressure Developing Intumescent Seals
Eg: Graphite or silicate based materials.

The majority of these seals are encased within a rigid PVC extrusion. PVC softens and degrades at similar temperatures to that of the initiation of the intumescent core. The casing offers no significant resistance to the expanding core and the presence or otherwise of coats of paint would not have any more effect than the PVC.

Without a protective casing, the intumescent materials can be located in the reveal of a door frame and are known to function perfectly well whether veneered or surfaced with a decorative laminate such as Formica. While such surfacing materials are typically less than 1mm in thickness, it is also known that construction veneers of up to 3mm thickness have been successfully tested in such applications. With this background knowledge, the thickness of even multiple coats of paint would present no impedance to the expansion characteristics of these seal types.

ABOUT IFSA

The Intumescent Fire Seals Association (IFSA) is the trade association dedicated to the science and application of intumescent based sealing materials for the passive fire protection industry.

The Association provides technical advice and guidance on all matters relating to fire door seals, smoke seals, glazing seals and all penetration/gap sealing problems.

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Concealed intumescent materials of this type will also comfortably perform when located in the edge of a door leaf, even under the confines of a full-thickness of 6-12mm lipping. There have been many successful fire test exercises to demonstrate this.

While this information is well-known to IFSA members, fire test reports that verify the above observations are almost invariably the confidential property of the sponsor, sometimes the subject of patent protection, and would not normally be found in the public domain.

Low Pressure Developing Intumescent Seals
Eg: Phosphate based materials.

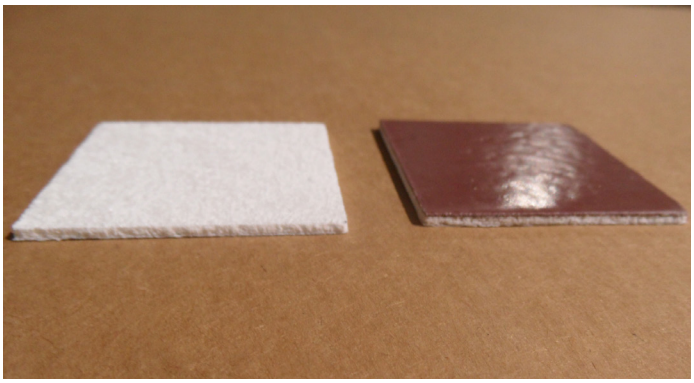
For low pressure developing intumescent materials, a painted surface will also soften and degrade at temperatures similar to the activation temperature of the intumescent material itself. In this softened/degraded form, the paint will not impede the expansion of the seal and tests show that no chemical reaction takes place that would adversely affect the performance.

Under fire exposure, the expansion of the seal will be progressive from the exposed edge to the non-exposed edge. This, together with the complementary interaction between the seal activation and the paint softening/degradation, will ensure that any volatiles being ignited will be on the exposed side rather than the unexposed face of the assembly.

From information provided by an IFSA member, it is known that successful fire tests have been carried out with low pressure developing seals over-painted with up to 10 coats of both water-based and oil-based paints. Again, the relevant tests are the confidential property of the sponsor and are not in the public domain.

Comparative Test

The photographs below show a direct comparison between two samples of low pressure developing intumescent material, each 50mm x 50mm x 2mm, with one being unpainted (naturally white) while the other has 5 coats of oil-based paint (brown). The total thickness of the paint is 0.3mm.



These photographs shows the samples before exposure and the comparison after 10 mins at 600ºC.

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It should be noted that these pictures were taken after "total immersion" in the heat source. This demonstrates:

(a) that the expansion is not inhibited by the coats of paint and

(b) that there has been no adverse chemical reaction to affect the performance.

While the expansion would be different if exposure on just one edge was to take place, as happens with a seal in a door assembly under test, the performance would be equally effective, whether un-painted or painted.

Conclusion

The analysis and evidence presented in this Fact Sheet shows that the overpainting of all known types of intumescent fire seals has no detrimental effect on the ability of the seal to perform effectively. Where a smoke or acoustic seal is present however, overpainting should definitely be avoided as the presence of dried paint on the sealing element will almost certainly impede the resilience and functionality.

MYTH BUSTERS

- **Intumescent seals generate high pressure when heated.**

  Some intumescent seals generate high pressures when confined but others generate very little pressure. In most applications the seal is not completely restrained so the pressure generated is much reduced.

- **Paint coatings will slow down the heat transfer to the intumescent seal making its reaction time longer.**

  Intumescent seals designed for door edge protection are usually contained within a PVC holder which will be of at least 0.5mm thick and this does not restrict the flow of heat into the seal significantly.

- **Low pressure intumescent seals will not be able to break through any paint layers on the surface.**

  Most paints are thermoplastic which means they soften on heating and which enables even low pressure seals to push them aside.

- **What if the paint layers are very thick?**

  It has been demonstrated that even 10 coats of paint will not affect the performance of low pressure seals. For high pressure seals used for concealed applications, where the lipping on the door covers the intumescent seal material, the pressure generated by these seals is sufficient to break the adhesive bond holding the lipping in place, together with the presence of any number of paint layers.

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