

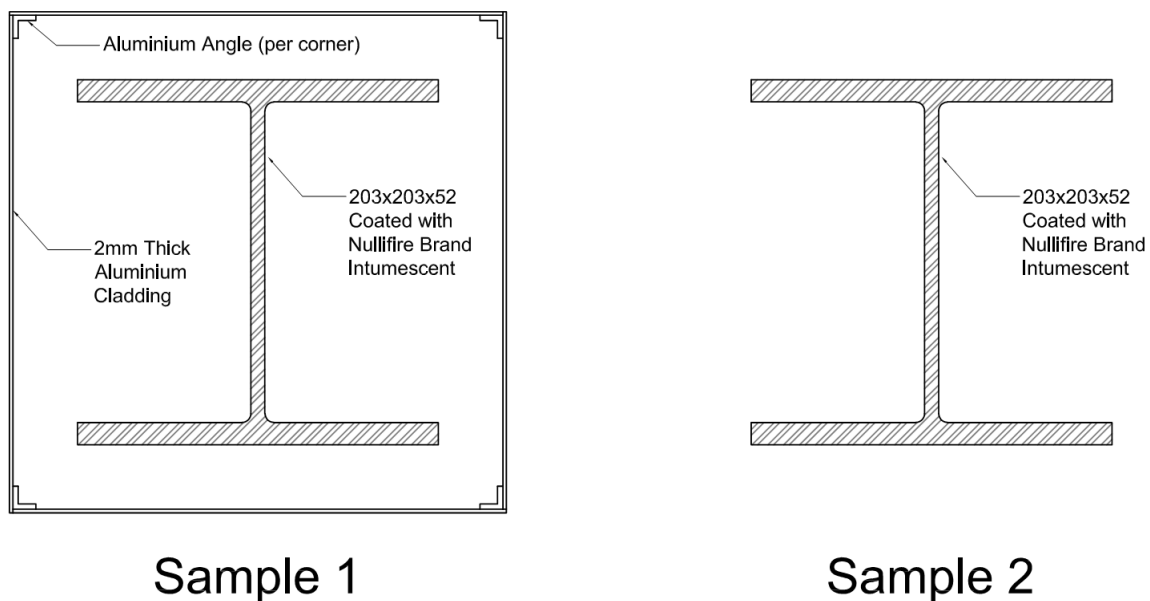
## SC902 Technical Advisory Note – PTA001

### Using Aluminium Cladding to Prevent Damages on Intumescent Coated Structural Steel

Fire protection on structural elements is now a common building design requirement/criterion. This applies to a variety of buildings, such as residential, educational, industrial and so forth. While each building has its unique functionality, sometimes a specific treatment on the fire protected element might be required.

One of the common enquires is associated with the robustness of the intumescent paint and its resistance to both intentional and unintentional damages after the construction is completed. This primarily occurs to visually exposed steel in educational facilities where coated steel is susceptible to physical attack by students. Nullifire SC902 intumescent paint is relatively robust compared to traditional waterborne intumescent products on the market. However, although this fire rated coating system has superb impact resistance, its ability to counteract continual excessive damages cannot be guaranteed. While it is impractical to further enhance the physical properties of the intumescent product, a possible solution was developed to assist architects and engineers in designing the building.

A fire test has been carried out in the past with a water-based Nullifire brand intumescent product. The test had a 2mm thick aluminium sheet encasing an intumescent coated column, with an approximately 35mm gap in between the cladding and steel column. Both elements were independent as there were no fixings or connections among the two objects as shown in Figure 1 below.



**Figure 1- Tested sample configuration.**

The test outcomes indicated that the aluminium cladded column (Sample 1) had relatively low steel temperature (approximately 143°C lower at 30 minutes and 86°C lower at 60 minutes) throughout the whole testing period compared to the stand alone intumescent coated column (sample 2).

This is reasonable as the steel column in sample 1 was not in direct contact with the flame until thermal distortion or detachment occurred of the aluminium cladding. Although the temperature differences were insignificant toward the end of test, the aluminium cladding did provide some degree of insulation to the steel column, and more importantly it did not deteriorate the fire performance of the intumescent system. Therefore, it is safe to state that as long as sufficient intumescent expansion clearance is allowed, installing cladding around the intumescent coated column would not have any adverse effect to the fire performance of the system.

## Benefit

The primary benefit of boxing out the intumescent coated column is associated with repair and maintenance. Fire protection is a life safety system and therefore ideally it would be best to avoid any damages. Depending on the building design, it could be costly and complex to conduct repair works. Instead of patching the fire protection system when it is damaged, boxing out the intumescent coated column would allow the cladding to act as an easily replaceable sacrificial layer. This could mitigate potential issue's caused by damages of fire protecting material throughout the building life.

## Permax Conclusions

The experimental investigation on the Nullifire intumescent product provides insight of possible solutions to prevent the fire protection system from damaging. By combining and analysing the associated test reports, aluminium flashing of 2mm thick, should not have any negative influence on the intumescent coating system as long as the design satisfies the following:

- Sufficient clearance to allow for initial intumescent expansion
- Not structurally fixed to the intumescent coated member
- Non-combustible

## Alternate Design Configuration

In cases where the aluminium flashing is preferred hard up against a coated column the product manufacturer, Nullifire, have provided an alternate fixing method. In this scenario the aluminium flashing should not exceed 2mm thick and can be installed using Sika Sikaflex-Pro sealant which has a melting temperature much lower than intumescent expansion temperature. If required, Permax can provide the technical guidance letter issued by Nullifire (Tremco) regarding this configuration. Further investigation is required for alternative product's with different characteristic.

Please contact Permax directly if looking for any project specific assistance.