Achieving Compliance to Specification with Intumescent Coatings.

ALTEX COATINGS LIMITED

- Founded in Tauranga in 1954.
- One of the Resene Group of companies.
- Number one market share position in industrial coatings.
- Massive growth in fireproofing product sales in recent years, and continuing.
- Highly committed to the fireproofing market with NZ based technical service personnel and representatives across the country.
- One of the major contributors to the FPANZ Code of Practice for Intumescent Coatings

Altex Coatings
Head Office,Tauranga

What are Intumescent coatings?

THIN FILM COATINGS THAT SWELL UPON HEATING, INCREASING IN VOLUME AND DECREASING IN DENSITY PRODUCING A CARBONACEOUS CHAR RETARDING HEAT TRANSFER TO THE UNDERLYING SUBSTRATE.

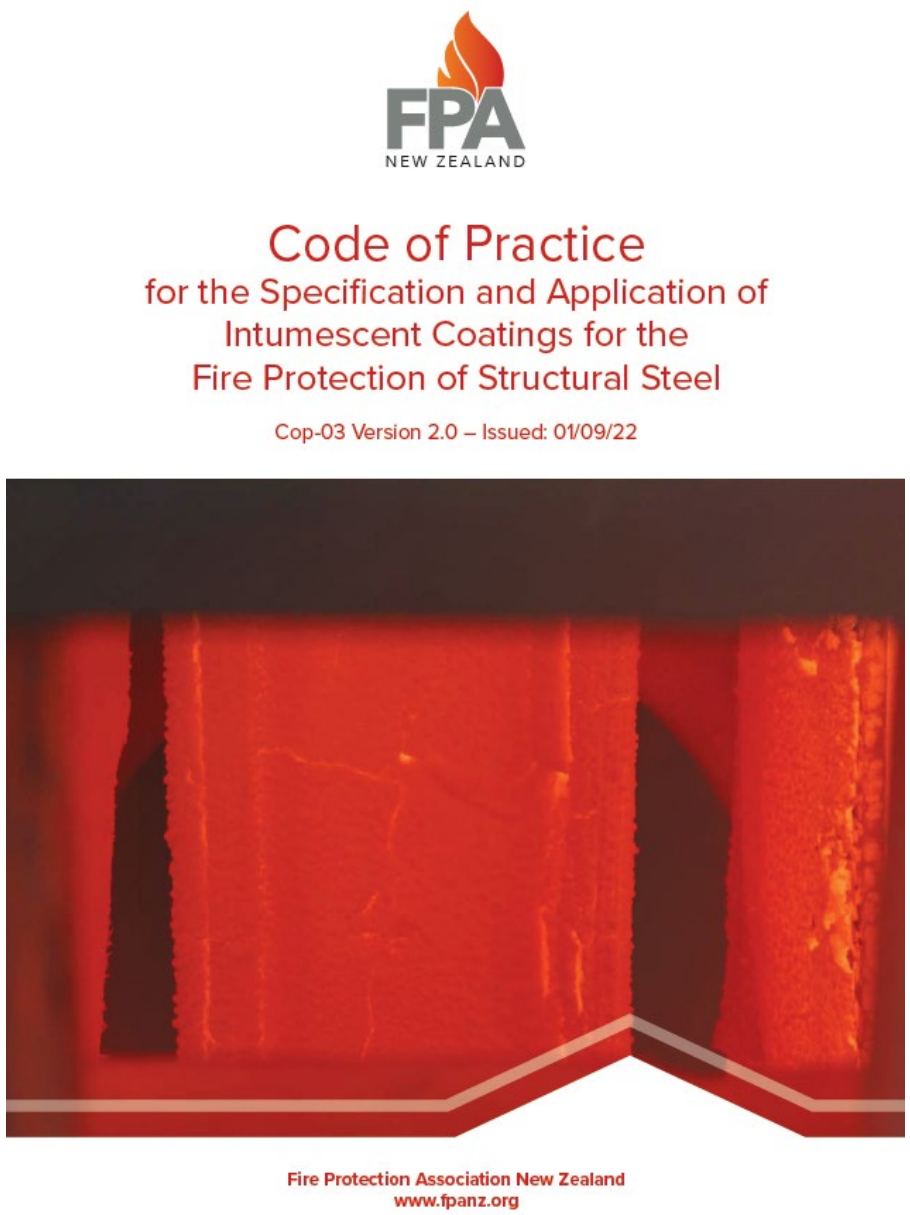
SAVING LIFE!

Intumescent in action…

Intumescent in action…

FPANZ Code of Practice

- A collective effort between fire engineers, council body reps, intumescent suppliers, contractors and third-party inspectors to lift the game of the NZ industry to where it should be.
- Brings clarity to all aspects of the process from specification through to application and final sign off.
- Section 6 covers all aspects of inspection for applicators and third party inspectors.
- http://www.fireprotection.org.nz/online-resources/fpa-codes-of-practice



Fire Proofing Coatings Systems

INSPECTION CONSIDERATIONS

FIREPROOFING OF STRUCTURAL STEEL

Intumescent coatings are <u>not</u> just "another coat of paint".

- They are a **vital design element** to maintain the structural integrity of the building allowing people to egress and firecrew to enter the building for the specified fire-rating period.

- Therefore they require special attention during system design and application to ensure a successful result.

Acute Services, Christchurch

CONSIDERATIONS WHEN INSPECTING A COATING SYSTEM:

Environment:

- Macro environments: where in the country does the building sit?
- Micro environments: interior hidden vs exterior exposed, under bridge/non rain washed areas, quasi-immersion scenarios, chemical fallout zones
- Duration and seasons/environments exposed to during construction

CONSIDERATIONS WHEN INSPECTING A COATING SYSTEM:

Is this the right product?

- Ensure that the right product has been used for the right environment
  - The coating system is built around the fireproofing technology to be used in the correct environment.
  - Water-borne single pack
  - Solvent-borne single pack
  - Solvent-borne two pack
  - Vermiculite or cementitious
- Each product has their own levels of weathering suitability and should be specified accordingly

Opus House

THE IMPORTANCE OF SEALER COATS TO INTUMESCENT COATINGS?

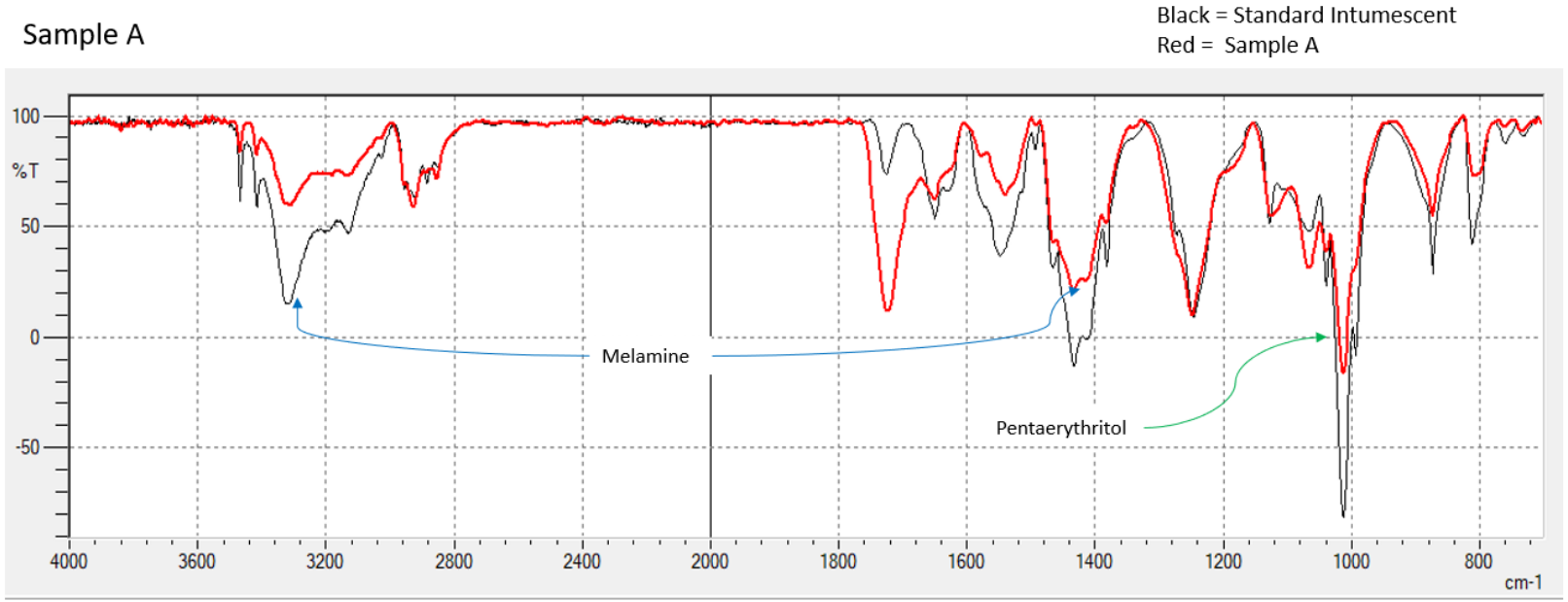
Effect of exposure to weather during and post construction

- In order of least resistance to most with no sealer/topcoat:
  - Single pack
    - Water borne
    - Solvent borne
  - Two pack

- All commonly used single pack intumescents have limits to their weathering resistance. They must be appropriately sealed/top coated during construction as well as for post construction periods.
- See the difference to the right showing sections with and without our Altex Pro~Seal Intumescent Seal Coat!

How do you know if an intumescent coating has been affected by moisture?

- Sometimes damage can be visually obvious as per previous slide BUT not always.
- If a sealer coat has not been used and the single pack intumescent has been exposed to rain/moisture for prolonged periods of time, the intumescent “special herbs and spices” can be dissolved out of the film and washed away but the film still looks no different to new.
- Sampling and testing using analytical chemistry methods can tell if the intumescent has been affected or not.



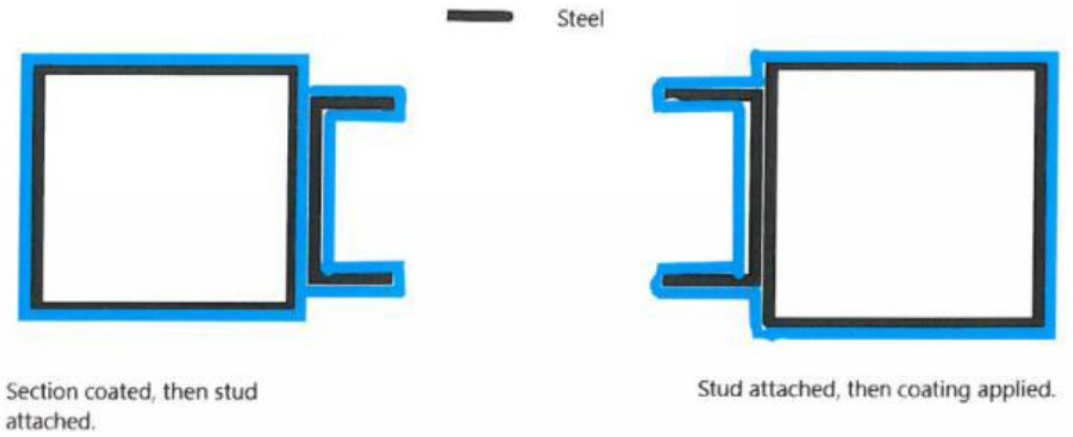
Fire Proofing Coatings System Design

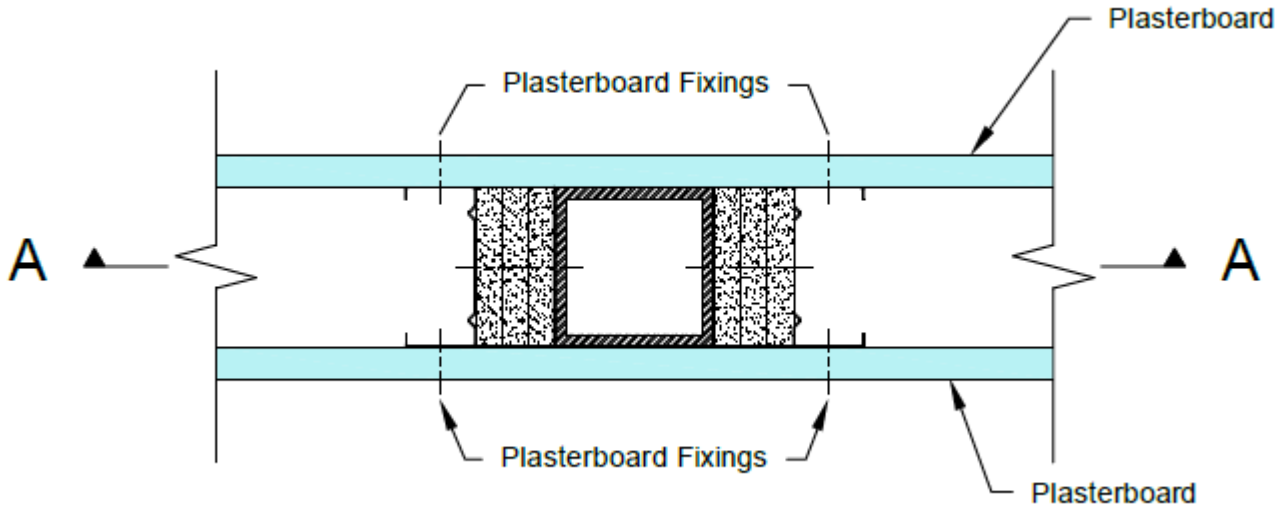
WHAT CAN VS CAN'T YOU DO?

WHAT IS KOSHER FOR ATTACHING FRAMING TO FIRE RATED STEELWORK?

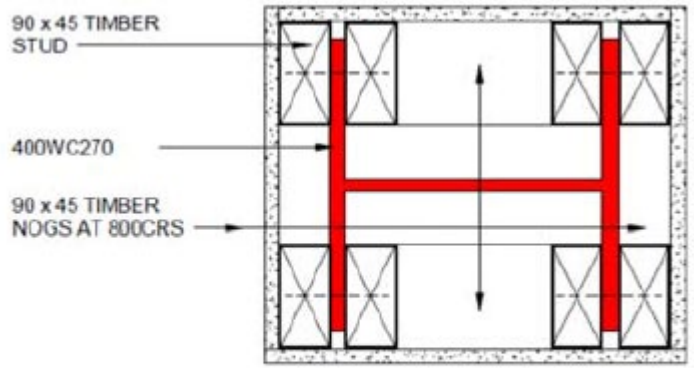
Unless proven by test by an accredited lab, a stand off distance must be created to enable the expansion of the intumescent coating to occur. This can be achieved by:

- "Z" clips
- Metal track stud fixing
- Use of calcium silicate boarding to act a packers



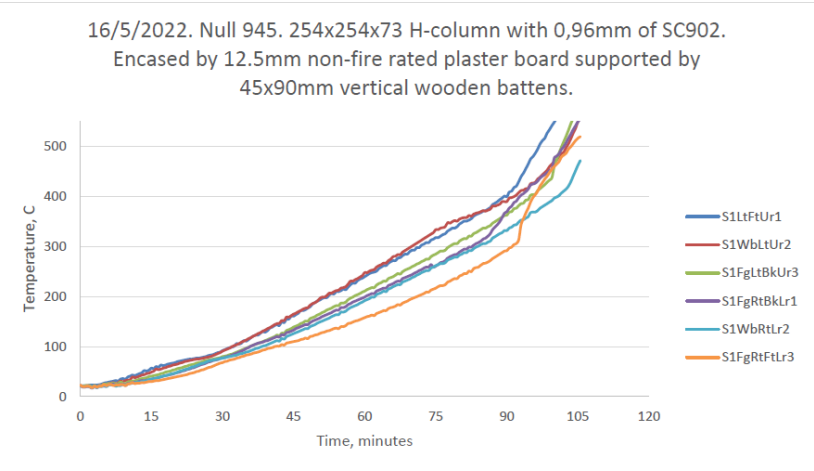


WHAT TESTING LOOKS LIKE FOR ATTACHING TIMBER FRAMING TO FIRE RATED STEEL:



Common building methods should be tested in a fire lab as per standard cellulosic fire curves in order to access any effect of the method to the overall combined fire performance. These should be available via the supplier of the intumescent coating.

BASIC 250UC73 COLUMN
(90 X 45 TIMBER FRAMING)



WHAT ARE THE ALLOWANCES FOR FIXING ATTACHMENTS TO FIRE RATED STEELWORK FOR SERVICES?

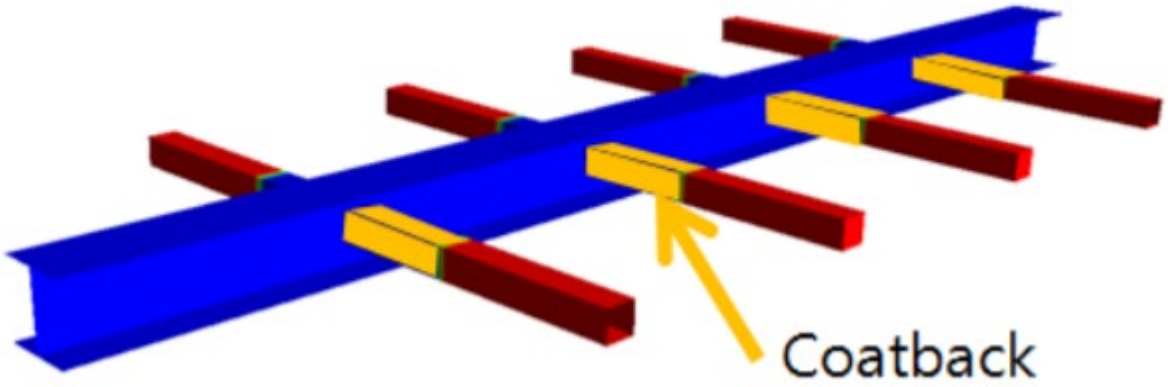
Various further questions arise:

- How big and how frequent are the attachments?
- Spacing of attachments?

- Coating's suppliers will each have their recommendations for the products they supply. Seek their advice!

Where do intumescent coatings stop and start between junctions of fire and non-fire rated steelwork?

This is known as coat back distance. Unless specified, it is necessary to protect the adjoining 500mm of “unprotected” steel with an intumescent coating to limit unwanted heat transfer. This should be covered in the project spec.



University of Auckland Science Building

WHAT HAPPENS WITH COMPOSITE FLOORING AND FIRE RATED STEELWORK?

- Additional film build is built into these situation for up to and including 90 minute ratings. 120 minute ratings must use fire rated block to cover the gap
- Effort should be made for the coating to be applied into the trapezoidal gap but not necessary to made it all the way through. This is practical allowance is built into the above allowance

Longevity and maintenance of fire proofing systems

	Water based Intumescent	Solvent based intumescent	Two pack Intumescent
No topcoat	C1 – life of building	C1 – life of building	C1 – life of building
Polyurethane @ 50µ DFT	C2 – up to 20 years C3 – not suitable	C2 – up to 20 years C3 – not suitable	C2 – up to 20 years C3 – up to 20 years
Polyurethane @ 150µ total DFT	C3 – not suitable C4 – not suitable	C3 – refer to supplier C4 – refer to supplier	C3 – up to 10 years C4 – up to 10 years

During the life to first major maintenance period spot repair to make good any corrosion, reinstate required intumescent DFT and repainted to replenish the protective topcoat layers.

C5 environments – only epoxy intumescents are suitable. Assumed 10 year service life.

No matter what the protective system used - liquid coatings, duplex galvanising or thermal metal spray, you will get no more than 10 years LTFMM due to the fire proofing component and its requirements.

MAINTENANCE

EXTENDING THE LIFE AND ENSURING THE EFFICACY OF THE INTUMESCENT COATING

RECOMMENDED MAINTENANCE SCHEDULE FOR INTUMESCENT-COATED STEELWORK

- Intumescent coatings are necessary for the maintenance of structural integrity through the period represented by the fire rating.

- The long-term viability of intumescent coating reliant upon the integrity of the protective sealers/topcoats which shields it from environmental factors.

- It is recommended that these systems are inspected and maintained for damage to ensure the long service life intended in the specification and the safety level required to maintain a fire rating.

DFT Inspection

What's involved in inspection of the film build thickness?

- Section 6.5.5 in the FPANZ CoP
  - Similar to normal protective coatings inspections but much more rigorous
  - Frequency and locations of readings more onerous and defined

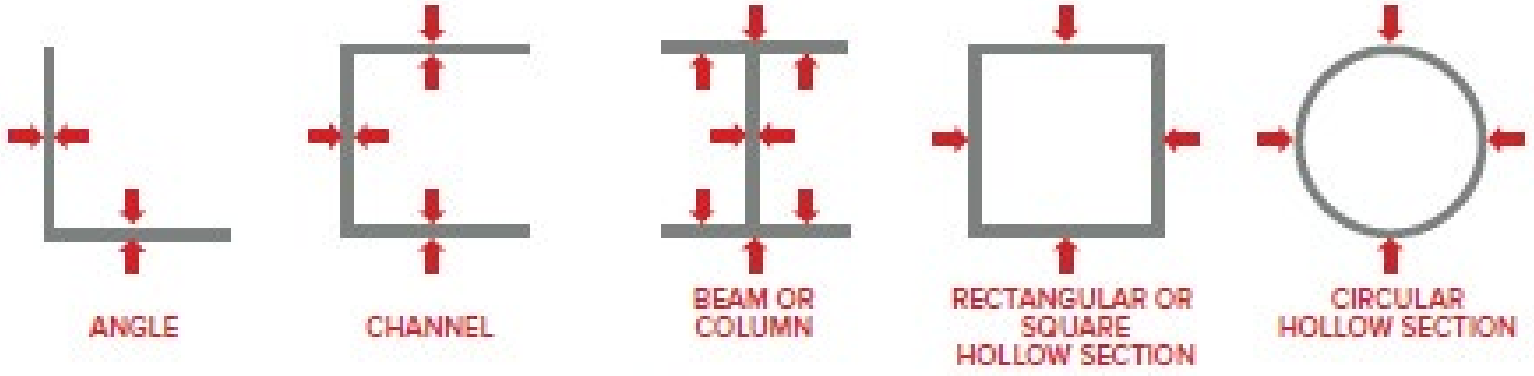


Figure 6: Pictorial guide for locations of DFT readings

- Defined DFT inspection acceptance criteria

6.5.5.3 Dry Film Thickness acceptance criteria

Good practice coating thickness acceptance criteria are as follows, assuming that the specified thickness is a nominal value:

a) The average dry film thickness applied to each element shall be greater than or equal to the specified nominal value.

b) The average measured dry film thickness on any face of any member shall not be less than 80% of the specified nominal value.

- Persons doing DFT checks need to be qualified and experienced.

- If the applicator hasn't got the qualified personal for internal QC checks, a third party should be involved.

- All records should be available upon request to view conformance to specification.

Local Case History

RECENT EXAMPLES

NZ International Convention Centre

- Architects: WAM and Moller Architects
- Main Builder: Fletcher Construction
- Construction: 2016 and still going!
- Steel Area: 180,000m^2

206 Victoria St West Apartments, Auckland

- Owner: Mansons TCLM
- Main Builder: Mansons TCLM
- Constructed: 2014-2015
- Steel Area: 8,000m^2
- Coating Systems:
  - Interior hidden steel: Carboguard 504/Firetex FX2002
  - Interior visible steel: Carboguard 504/Firetex FX2002/E~Line 949
  - Exterior visible steel: Interior visible steel: Carbozinc 859EZ2/Firetex FX2002/E~Line 949 (x2 coats)

University of Auckland Science Building 202

- Owner: University of Auckland
- Architect: Architectus
- Main Builder: Fletcher Construction
- Constructed: 2014-2015
- Steel Area: 50,000m^2

Fonterra Corporate Office Auckland

- Owner: Goodman Group
- Architects: Jasmax
- Main Builder: Fletcher Construction
- Constructed: 2014-2016
- Steel Area: 8,000m^2

Merchant Quarter Apartments, New Lynn

- Developer: Tasman Cook
- Architects: Jasmax
- Main Builder: Kalmar Construction
- Constructed: 2013-2014
- Steel Area: 10,000+m^2

Summerset Hobsonville (Stage 1 and 2), Summerset Ellerslie Main Building and Apartments (Stage A and B)

- Engineer: Silvester Clark
- Main Builder: Summerset Group/Dominion Construction
- Constructed: 2015-2017
- Steel Area: 60,000+m^2

Botanica Apartments, Mt Eden, Auckland

- Developer: McDougall Reidy/Hayden and Rollet
- Architect: Peddle Thorpe
- Main Builder: Hayden and Rollet
- Construction: 2015-2017
- Steel Area: 8,000m^2

TAKEAWAYS FROM THIS THIS…

- Intumescent coatings are a critical ‘structural’ element of building
- FPANZ Code of Practice is a must to follow for the correct outcome to be guaranteed for your project!
- The right product/system must be used for the right environment
- There are ways of telling if an intumescent is still in good condition.
- Construction methods of fixing material to fire rated steelwork must be verified by the supplier for validity
- QA/DFT checks must be provided to prove that the required film builds are met to gain the FRR.
- Inspections and maintenance a MUST to keep the fire rating of the building in place.

New Burwood Hospital

THANK YOU FOR YOUR TIME!