

Structural Steel Fire Protection

Advanced Intumescent Technology

The architect's first choice for structural steel fire protection.

ADVANCES IN PASSIVE FIRE PROTECTION

Intumescent coatings is the fastest growing segment of the Global Passive Fire Protection materials market. New intumescent coating technologies have far outstripped the outdated sprayed vermiculite process with designers around the world opting for clean, effective and flexible fire protection solutions that will enhance their steel design.

The new technology intumescents can be painted directly on to internal, semi-exposed and external steelwork. To achieve a specific FRL, a coating thickness is specified for the type of steel section based on the calculated Hp/A. When exposed to temperatures of around 180°C or more, the intumescent swells, increasing in volume and decreasing in density. This process creates a thick layer of inorganic 'char' which thermally insulates the steelwork from reaching its failure temperature for the specified FRL e.g. 30, 60, 90 or 120 minutes. This time frame allows fire fighters to enter the building, extinguish the fire and prevent premature collapse of the structure.

Thin-film hybrid intumescents also have many advantages over conventional sprayed fire protection systems. This patented technology, STP (Silane Terminated Polyether), provides unique coating performance in that it can be applied directly to blasted steel in a single application without the need for a primer (internal and semi-exposed), weather resistant in 1 hour and is fully cured within 8 hours (cures down to 0°C).

THE BENEFITS OF NULLIFIRE HYBRID TECHNOLOGY

- No Isocyanates
- Low VOC formulation
- Low hazard, low odour
- Compatible with high-end primers and top coats
- Very surface tolerant, cures in low temperatures and high humidity
- Suitable for both External and Internal steel work
- High build, easy to apply saves labour costs
- Fast-track system, minimises program time
- Existing spray equipment can be used
- Increased damage resistance
- Simple and fast to repair

The ability to correctly select and specify products is crucial to preserving life and protecting structures.



When seeking a cost effective structural steel fire protection solution for your project, there can be a number of important factors to consider that will influence the decision making process:

- Location internal, external or both
- The required Fire Resistance Level (FRL)
- The size of the steel to be used in the design

TYPES OF FIRE

Fires can be classified as either Cellulosic or Hydrocarbon. The difference between them in relation to fire protection is how quickly each reaches its maximum temperature range. While structural steel cannot burn, it can lose strength and is prone to warping as it increases in temperature. Under classic 'cold design' rules, steel can suffer structural failure at just 550°C.

Hydrocarbon Fires are fuelled by hydrocarbon compounds such as gas and petrol. They typically occur in oil and gas production facilities or petrochemical installations.

Cellulosic Fires are fuelled by cellulosic materials such as timber, fabrics, furniture and paper. They mainly occur in buildings such as offices, hospitals, shopping centres and residential buildings.

FIRE RESISTANCE LEVELS (FRLs)

Section C of the National Construction Code (NCC) requires all load bearing building elements to have adequate fire protection. Fire Resistance Levels (FRLs) are used as the performance indicator throughout the Building Code of Australia (BCA) and the Australian Standards.

The Australian Standard defines the FRL as the performance indicator of various building elements in minutes, which is determined by subjecting a representative specimen to the standard time – temperature curve regime as set out by AS1530.4.

The FRL is defined as the grading in minutes for three criteria, Structural Adequacy, Integrity and Insulation.

Structural Adequacy

The ability of a load bearing element of construction to maintain stability and adequate load bearing capacity when tested in accordance with AS1530.4.

Integrity

The ability of an element of construction to resist the passage of flames and hot gases from one space to another when tested in accordance with AS1530.4.

Insulation

The ability of an element of construction to maintain a temperature, over the surface that is not exposed to the flames, below the limits specified when tested in accordance with AS1530.4.

The FRL is expressed as: adequacy/integrity/insulation. For a wall to meet an FRL of 120/60/30 it must maintain structual adequacy for 120 minutes, integrity for 60 minutes and insulation for 30 minutes, when tested in accordance with AS1530.4.

Structural Adequacy

Integrity

Insulation

The intumescent coating of the columns in this diagram provides the first part of the fire performance requirement, Structural Adequacy FRL 60/-/- . The other elements such as the cladding provide the Integrity and Insulation components, which satisfy the remainder of the FRL designation.

. () () Nullifire is with you from product selection and specification to installation and verification.

STEEL SELECTION

One key aspect of structural steel design is how the steel section selection process is impacted by FRL designations.

Many designers do not fully understand that the correct steel size and thickness must be selected in order to meet certain FRLs. Their decision should be based on test evidence that specifies which Hp/A is needed to achieve the required FRL.

The 'Hp/A' is the ratio of the fire exposed perimeter to the cross-sectional area of the steel, and governs the heating rate of the steel during a fire event. The 'Hp' represents the heated perimeter exposed to fire in linear metres and the 'A' is the cross-sectional area of steel, in square metres. Generally a larger, thicker steel section will have a greater ability to resist fire, and therefore a lower Hp/A than a smaller, thinner steel member.

It is crucial to select steel sizes which not only meet factored structural compressive loads, but also reckon with reduced load capacities during a fire event.

Designing for a balance between achieving the required loads and exceeding the required Hp/A will give the best result in regards to structural adequacy, fire safety and overall project cost.

NULLIFIRE AUSTRALIA TECHNICAL SUPPORT SERVICES

The NCC at the best of times can be somewhat complex and the laws around fire safety often more so. In fact, many building industry professionals find themselves a bit confused when trying to ensure NCC compliance. Fortunately, Nullifire Australia is there, ready to help when needed with design and contract support including assistance in the crucial selection and specification of products to meet requirements.

Nullifire Australia delivers a new level of support to industry professionals who are seeking information on structural steel fire protection. Our expert technical and structural engineering department can provide you with an optimisation solution based on your specific structural loadings and fire performance requirements. This optimisation can reduce overall project costs, prevent delays and streamline the application, delivery and erection process for onsite and offsite projects.

Nullifire products and services have been used in a number of new, existing and refurbished projects including; 111 Eagle Street Brisbane, the Melbourne Airport T4 Terminal building and the Air New Zealand lounge at Brisbane International Airport. You will find concise case studies about these projects and more on our website: www.nullifireaustralia.com.au.

If you are interested in learning more about specification of intumescent coatings for structural steel fire protection, contact us and we can arrange to have a consultant present a CPD workshop at your premises.

Nullifire Australia is with you all the way, providing the ultimate solutions for structural steel fire protection. New generation 'hybrid' intumescent coating for structural steel fire protection.

In 2013, Nullifire engineered the world's first hybrid intumescents, Nullifire SC900 Series. Today, Nullifire is the global leader in 'hybrid' intumescent technology, and in Australia it is the market leader for intumescent coatings for structural steel fire protection.

TECHNICAL PARTNERSHIP

In an exclusive partnership, Nullifire Australia and Wattyl have established a working relationship to offer a range of coating solutions incorporating the Nullifire SC902 intumescent base coat system. Wattyl Protective Coatings provide high performance finishes engineered to enhance the integrity and aesthetics of composite coating systems for structural steel fire protection.

Our partnership with Wattyl also allows us to offer you access to an expanded team of dedicated technical specialists. They are able to assist you through every phase of your project: from initial design and specification, through to supply and finally application.

NULLIFIRE SC900 SERIES

The SC900 series is the 'next generation' of structural steel fire protection products. Two hour fire protection can be achieved with just one coat, in 24 hours instead of 7 days for conventional products.

The SC900 series offers all the performance benefits of 90 and 120 minute water-based intumescent coatings but with the unique benefit of rapid cure technology. It can be applied on or off site in a wet film thickness of up to 6.5mm, for 120 minute fire protection in one coat, and fully cured, within 8 hours – a 60% cut in application time.

NULLIFIRE S700 SERIES

Nullifire S707-60 is a thin film, water-based intumescent coating formulated to provide up to 90 minutes fire protection for selected heavy steel sections. The product is very low VOC and is most suited to on-site application to suitably prepared steelwork. It is compatible to a variety of primers and top seals.



Speak to the experts (07) 3865 5554 www.nullifireaustralia.com.au

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