PROACTIVE FIRE TRENDS

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for Asia Pacific Building Industry Professionals

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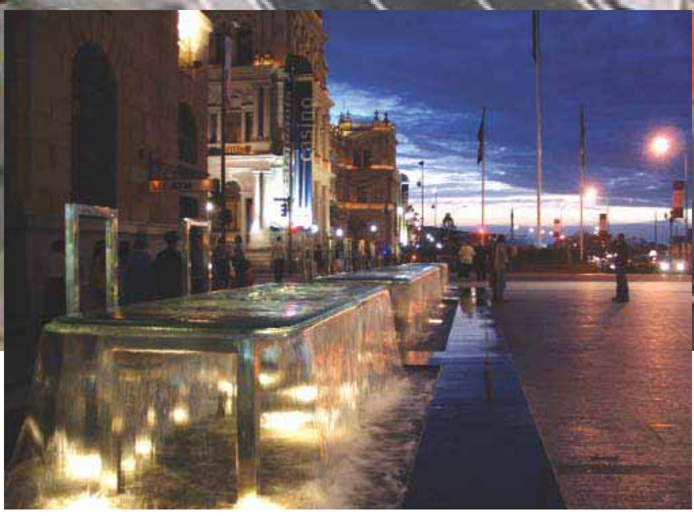
● Inner Northern Busway project wins award

Promat helps fireproof tunnel in new express busway system



Brisbane is Australia's third largest city with a population of more than 1.6 million inhabitants. Blessed with a pleasant subtropical climate and wide open spaces, the capital of Queensland is a magnet for people from other states.

Unfortunately, it has not been spared the traffic woes which afflict many other metropolitan conurbations worldwide. In fact, it has been predicted that the single biggest threat to the city's enviable quality of life will come from the additional half million cars expected on urban roads by 2011.

Not surprisingly, one of the government's key traffic reduction strategies is to significantly increase the use of the public transportation network.

The overall strategy proposes a busway network stretching across Brisbane city, providing fast, reliable and convenient bus services which build on the already strong role of buses in the region.

Dedicated busway system to help ease traffic pressure

The Inner Northern Busway (INB) is the second busway in the network to be built. When complete, INB will be a 4.7 kilometre dedicated roadway for the exclusive use of buses and emergency vehicles.

Design and construction of the busway and busway stations involves the combination of civil design, building design, electrical design, Intelligent Transport System (ITS), transportation architecture, landscape design, environmental graphics and public art.

Ultimately the busway will include six tunnels, seven stations, one viaduct, two bus layovers and three bus turn-arounds. Overall design allows for possible future conversion to light rail.

The estimated cost of constructing stages 1 and 2 of the busway was A$135 million, financed by the State Government working with the Brisbane City Council. The state contributed A$120 million while the BCC contributed A$15 million.

Ten sections built in stages

The Inner Northern Busway will consist of 10 sections to be built in stages. The construction timetable will take into account factors such as funding, integration with other major projects (such as the Inner City Bypass), consultation with key stakeholders, major events in the CBD while minimising the impact and disruption to traffic, businesses and residents.

INB will link the Brisbane central business district (CBD) to the Royal Brisbane Hospital (RBH) with stations at King George Square, Queensland Place, Countess Street, Normanby Fiveways, Queensland University of Technology Kelvin Grove Campus, Royal Children's Hospital (RCH) and Royal Brisbane Hospital.

Other locally important and populous venues close to the route include Roma Street Transit Centre, Suncorp Stadium, Brisbane Boys and Girls Grammar schools, Brisbane Boys Grammar Sports Centre, Victoria Park Golf Course and the popular Royal National Association (RNA) Exhibition Grounds.

Major benefits for a diversified community

The design standard of the Inner Northern Busway (INB) will be similar to that of the South East Busway. This will provide a consistent, easy-to-use Busway Transport Network.

The ambitious and timely INB will eventually connect with the existing Queen Street bus station and link with the South East Busway. The full Inner Northern Busway will ultimately benefit the community by:

- Providing reliable, congestion free running of buses from the northern suburbs of Brisbane.
- Decreasing travel time.
- Reducing costs for operators.
- Reducing vehicle emissions.
- Providing a higher capacity compared to buses running in general traffic.
- Encouraging sustainable urban development.
- Providing improved running times for emergency vehicles.

Promat contribution to Section 3 Brisbane Tunnel of INB

A tunnel was required because the Queensland's main rail hub passed over the busway. The start of Section 3 (from Roma St) formed a tunnel which was split into 4 zones:

Zone 1 Broken further into 3 zones (i.e. 1A, 1B & 1C), concrete slab poured onto concrete lintels supported by concrete headstocks. Movement was expected between each zone connection.

Zone 2 Eight approximately two metre deep welded beams at 1.8m centres supported by concrete transfer beams.

Zone 3 In situ concrete slab.

Zone 4 600mm wide concrete lintels supported on headstocks, each moving independently.

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Point of View

CONNECTIVITY FOR MANKIND

The recent Christmas weekend – blessed with family and friends and far too much delicious food and good cheer – was coming to a comfortable, satisfying close. Any thought that all seemed right with the world was banished by a sudden deluge of horrifying news! The headlines and images were truly overwhelming but the reality of the aftermath of the massive submarine earthquake in the Indian Ocean was far worse, defying comprehension. In many areas the devastation was total, destruction complete, the cost to life and property almost beyond normal reckoning. More than 250,000 victims, total communities lost forever and something like five million people either displaced or directly affected in some life-changing way. The response to help was gratifyingly rapid but rebuilding will take many long years, even with the generous and continuing outpouring of aid and relief from local and international communities alike. The Japanese word "tsunami" is now indelibly etched into our consciousness with new and horrifying meaning, underscoring once more not just the tenuous nature and very fragility of life but how all civil societies are inevitably and deeply interconnected!

At times like this it is natural and good to rethink our priorities. First and foremost, we work for ourselves, our families, a better future. Most do this by dedicating a large part of thier lives to a business organisation, such as Promat and many others, big and small. We strive to always do our best at both professional and personal levels. Secondly, we are fortunate at Promat because we manufacture and market products, systems and services which have direct, meaningful benefits for people, the environment and society as a whole. Our work often saves lives. Third, count our many blessings because, no matter how good or bad we think our results might be, without a doubt there is someone out there who is not quite so fortunate. I believe it is our responsibility to help wherever and whenever possible. It is significant to note that one of our sister companies in Indonesia, on behalf of the worldwide Etex Group, has made a substantial contribution to the rehabilitation effort in north Sumatra.

Australia was one of the countries in the region to react with very generous assistance. Thus it is noteworthy that this PFT, our fifteenth by the way, is also our first country-dedicated issue and it takes a close look at the work of our colleagues and business associates in the big, wide sunburnt country Down Under. Since our initial investment in 1998, Promat Australia Pty. Ltd. has focused on fire stopping products from the company's ISO 9000: 2000 and ISO 14001 certified factory in Adelaide. More recently, we have established a "second leg" in the market with fire-rated boards. Dedicated and knowledgeable people, excellent world-beating products, a healthy economy and a sensible business strategy continue to bear fruit in Australia.

Our lead story on pages 1 and 2 looks at a Brisbane tunnel utilising PROMATECT®-H, PROMATECT®-L and PROMATECT®-S. In Science and Research on page 3 a technical note from Fire Protection Association Australia reviews the floor waste system. Our centre page spread reviews a special project using a wide range of Promat products, at the innovative inner Sydney redevelopment of a very small electrical substation. Page 6 features Promat contributions to two Adelaide projects at Kings Baptist College and Norwood Plaza. As usual we run our multilingual feature on page 7 while on page 8 an overview of Promat involvement in Melbourne's stunning new Eureka Tower, the world's tallest residential complex, rounds out PFT15.

In conclusion, I am as saddened as you by global tragedies but inspired by man's ability to rise to the occasion when faced with seemingly impossible challenges. The two opposing forces will always be present but our work and our successful results are a small testament to the fact that interconnectivity can help us equally in business and in life.

Keep connected, stay in touch and keep up the good work !

Erik D. van Diffelen
Managing Director

Promat Asia Pacific Organisations

April 2005

PROACTIVE FIRE TRENDS

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The Promat International Asia Pacific Network spans the region with innovative proactive fire protection products, systems and solutions: Australia, China, Hong Kong, India, Malaysia and Singapore, with distributors in Brunei, Indonesia, Japan, New Zealand, Philippines, South Korea, Taiwan and Thailand.

ProActive Fire Trends is published by Promat (Malaysia) Sdn. Bhd. (PMSB) and Promat Building System Pte. Ltd. (PBS) for professional organisations and/or individuals interested in the fire sciences industry in the Asia Pacific region.

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Promat helps fireproof tunnel in new express busway system

Continued from the cover

The Queensland Government required the support structure to be provided with 4-hour hydrocarbon fire protection, allowing the railway to remain open during or after a fire. A 50-year product warranty was also sought.

Cementitious spray options were considered but eventually rejected due to concern that expected movement within the structural elements would be detrimental to the cementitious spray.

Fyreguard-Promat partnership resolves concerns

To resolve many inherent concerns, Fyreguard Pty. Ltd., the project's installation contractor, and Promat Australia Pty. Ltd., supplier and technical consultant, together designed a method using PROMATECT® board. Construction zones required three different methods of fire protection:

Zones 1 & 4 – Concrete protection

2 layers of 15mm PROMATECT®-H fixed to a 1.5mm top hat section. The top hat spanned any gaps between the concrete lintels and provided deflection to prevent risk of cracking in the PROMATECT®-H. Each zone connection within Zone 1 included a movement joint detail made of layers of PROMATECT®-H.

Zone 2 – Steel protection

The brief stipulated provision of four hour hydrocarbon structural steel protection to limit temperature rise and any subsequent expansion of the steel.

An allowance for movement of the individual steel members and also to provided a load bearing catwalk with access panels to allow periodic inspection of the steel members were also expected.

The design prepared for the clients featured steel brackets designed to clamp on to the bottom flanges of the steel beams and channels provided at 1200mm centres.

A composite of 25mm PROMATECT®-L and 9.5mm PROMATECT®-S was used to provide the fire rating and live load catwalk requirements.

A fire test of the proposed construction – requiring a specific concrete "mini" tunnel to be constructed with sample access panels within – was conducted at Warrington Fire Research Australia. Live load test was also performed while the structural calculations were performed by independent structural engineers.

In the final analysis, the project for Section 3 Brisbane Tunnel of INB used 440m² of 9.5mm PROMATECT®-S, 630m² of 25mm PROMATECT®-L and 2250m² of 15mm PROMATECT®-H.

The contracting arm of Fyreguard installed the frame and boards in the zones over eight weeks as access permitted only six men using all terrain elevated work platforms.

Following completion of board installation, the entire ceiling was painted matt black.

Inner Northern Busway (INB) wins Queensland Award

Now in their 12th year, the Case Earth Awards – sponsored by Case Construction Equipment and the Civil Contractors Federation (CCF) – recognise and reward the significant and innovative environmental reform that continues to take place in the construction industry.

The civil construction industry in Australia is apparently valued in the vicinity of A$10 billion per annum, employing in excess than 40,000 people. According to some sources, it is an industry committed to construction innovation and continually improving environmental outcomes.

Winning projects in last year's prestigious Queensland Case Earth Awards ranged from standard-setting residential developments to urban infrastructure and even a constructed lake.

All of the projects demonstrated outstanding commitment to the environment and the use of innovative ideas to ensure construction excellence was achieved without environmental harm.

The Brisbane Inner Northern Busway won an award in the Construction Excellence category in the Case Earth Awards. PFT

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● Technical notes of Fire Protection Association (FPA) Australia on floor waste systems

Fire collars for floor waste – Understanding BCA compliance options

There has been a great deal of discussion in recent times regarding the fire testing requirements for fire collars for use on plastic pipes. Some warnings have been issued to Certifiers (Building Surveyors) in relation to this issue.

This Technical Bulletin was prepared by FPA Australia's Passive Fire Protection National Technical Committee (TC/18) in an attempt to provide a balanced overview on the options available to Certifiers in relation to acceptance of fire collars for their project at hand.

It provides some specifics in relation to the relevant Building Code of Australia requirements (BCA), fire testing in accordance with relevant Australian Standards (AS) and some information regarding Fire Resistance Levels (FRL's).

Building Code of Australia (BCA)

Since 1996, we have operated under a Performance Based Building Code (BCA). Under this regime, compliant buildings must meet the relevant performance requirements of the BCA. Compliance can be achieved by way of an Alternative Building Solution or a Prescriptive (also known as a Deemed-to-Satisfy) Building Solution or a combination of the two.

Performance Requirements for fire collars

In terms of fire compartment barriers and fire separation, inclusive of service penetrations such as fire collars, the relevant BCA performance requirement is CP8:

"Any building element provided to resist the spread of fire must be protected, to the degree necessary, so that an adequate level of performance is maintained:
a) where openings, construction joints and the like occur; and
b) where penetrations occur for building services."

Prescriptive or Deemed-to-Satisfy Requirements for fire collars

Clause C3.15 provides the relevant prescriptive provisions for fire compartment barriers, fire separation and specifically the openings provided for fire services such as fire collars. C3.15 provides a number of alternatives for different configurations. Two relevant alternatives, sub clauses (a) and (b) are replicated below:

"Where an electrical, electronic, plumbing (see figure), mechanical ventilation, air-conditioning or other service penetrates a building element that is required to have an FRL with respect of integrity or insulation, that installation must comply with one of the following:

a) The method and materials used are identical with a prototype assembly of the service and building element that has been tested in accordance with AS4072.1 and AS1530.4 and has achieved the required FRL.
b) It complies with (a) except for the insulation criteria relating to the service if –
   i) the service is protected so that combustible material cannot be located within 100mm of it: and
   ii) it is not located in a required exit."

Understanding Fire Resistance Levels (FRL)

A Fire Resistance Level (FRL), is a term used in the Building Code of Australia to provide a uniform nomenclature for the "fire rating" or the prescriptive or "deemed-to-satisfy" requirements for specific element of construction. Under the prescriptive or "deemed-to-satisfy" requirements and depending on the Class of Building (occupancy type) and Type of Construction (rise in storey), the FRL requirements are provided in non-ambiguous tabular form.

The FRL is designed to cater for structural elements and both load bearing and non-load bearing fire compartment barriers, fire separations and any openings for penetrations and services. FRL ratings are determined by subjecting a representative test specimen to the standard fire test; defined in the BCA as AS1530.4 and AS4072.1, the latter providing more detailed advice to for service penetration and control joints, complementing Section 10 of AS1530.4.

NOTE: At the time of writing AS1530.4 and AS4072.1 were close to republication and all the fire testing requirements will be contained exclusively in the new version of AS1530.4, leaving AS4072/1 as a product standard, to deal with design, variations for tested specimen, installation and documentation / marking; akin to AS/NZS1905/1 for fire doors.

The FRL consists of three ratings in minutes (rounded down to the nearest 30 minute time increment), namely Structural Adequacy, Integrity and Insulation, designated in the following format:
FRL = Structural Adequacy / Integrity / Insulation
Example = 120/120/60

These ratings are determined from the standard fire test, or by way of formal opinions or assessments by Registered Testing Authorities in strict accordance with the acceptable protocols for variations to tested specimens outlined in the relevant product standard.

NOTE: For fire collars the variations need to be in accordance with AS4072.1.

Structural Adequacy
In terms of the standard fire test, failure for structural adequacy is deemed to have occurred when the element collapses or the rate of deflection for the element is in excess of prescribed limits.

Integrity
In terms of the standard fire test, failure for integrity criteria, for elements intended to separate spaces and resist the passage of flame from one space to another, is deemed to occur when continuous flaming occurs on the non-exposed side of the tested specimen, or when cracks, fissures and other openings through which hot flames and gases can pass through are present (the method of measurement is given in the test method).

Insulation
In terms of the standard fire test, failure for insulation criteria, again for elements intended to separate spaces and resist the passage of flame from one space to another, is deemed to have occurred when the temperature rise of the non-exposed side exceeds predetermined thresholds, typically being a temperature rise of (average) 140°C and maximum 180°C. For penetration seals, only the maximum failure criteria of 180°C is used.

FRL and Service Penetrations

Service penetrations such as fire collars are not a structural element; that is they are typically non-load bearing. This should result in the first element of the FRL being represented as a dash (-), or the nomenclature for Not Applicable (NA).

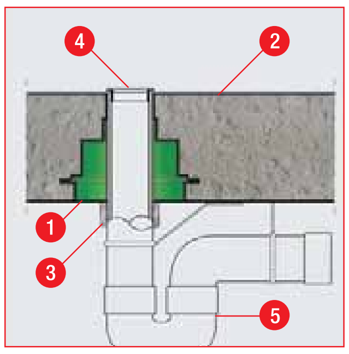
The only two FRL components that govern service penetrations are integrity and insulation criteria.

For fire collars the following applies:

In layman's terms, applying the definition above, Integrity means the ability of the fire collar to effectively crush the plastic pipe type in question and seal the opening such that no hot flames or gases can pass through. The results are very conservative in many ways, as any visible through gap into the fire test furnace is deemed a failure, even if cotton wool pad, which is often applied by the request of the test sponsor, is not ignited when placed adjacent to the through opening in question.

Insulation is determined by placing fixed thermocouples in pre-determined positions, to measure the heat passing through the penetration and the adjacent fire-separating element (floor, wall or ceiling).

NOTES:
1. Often the FRL for a service penetration is incorrectly designated with the Structural Adequacy the same as Integrity, but strictly speaking this is not correct as the penetration seals are non load bearing.
2. Often specification call for an hourly rating, such as 1 hour, which does not accurately define the integrity and insulation requirements.



1. Example of cast-in collar
2. Sand or cement backfill
3. Plastic piping
4. Floor grate fixed to top of waste pipe
5. Typical waste construction including S-trap and fittings

Form and Composition of Tested Specimens

Generally speaking the fire-tested specimen should be representative of what would be used in the field.

The standard fire test states that:
"The test specimen shall be –
a) representative of the element of construction; and
b) made of materials and to standards of workmanship representative of those applying in practice and as defined in relevant Australian Standards."

Fire testing is expensive, and it is not practical to test every conceivable configuration and therefore AS4072.1 provides some guidance and allows for acceptable variations to tested specimen, many of which allow Registered Fire Test Laboratories to provide formal opinions/assessments or fields of application.

For fire collars, what does this mean?

The following is a list of factors that need to be taken into consideration when assessing fire collars and their suitability for the intended application in the field.

- Separating element Pipe type (uPVC, HPDE, ABS etc)
- Pipe size (Nominal diameter of 32mm, 40mm, 50mm, 65mm, 80mm, 100mm ,150mm, 225mm etc)
- Pipe wall thickness
- End conditions of pipe during test (open or closed on fire and/or non-fire sides respectively)
- Location of any fittings (within or not within the fire collar body)
- Fixing types and numbers used
- Annular space between intumescent material and outer diameter of pipe
- Annular gap between pipe and separating element
- Location of collar (cast into concrete or soffit mounted)
- Additional fire stopping materials employed (sealants, mortars or grouts)
- Type of plumbing penetration (terminating floor waste with grille or through continuous through penetration of pipe)

This list is not definitive and the reader can see that there are a number of factors that need to be considered.

Historically, this is basis for the development of AS4072.1, first published in 1992. It provides some specific advice on the requirements for fire testing and allowable variations from tested specimens.

NOTE: AS4072.1 in many ways is unique to Australia and does in fact require more fire testing than most other developed countries around the world.

Applicability of fire test results or FRLs to real life conditions

An important point to highlight is that FRLs are determined from a single test under one standard heating condition. The standard test has been developed and used for Building Code requirements to help grade and qualify and compare and contrast different product against this one uniform heating regime only. The standard fire test provides the following qualification, which needs to be understood.

Fire Hazard Assessment

The results of these fire tests may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions. In terms of real life fire scenarios and the validity of the results, it is anyone's guess as what is going to happen, as there are many different fire scenarios which, depending on the product and application in question, could yield very different performance attributes.

Insulation Waiver

The Building Code of Australia has identified that insulation waivers are often a practical and acceptable solution in terms of fire hazard.

Example 1
Clause C3.15 b, for example, allows an insulation waiver for any service penetration as long as it is not in a required exit and with some specific controls against contact by combustible materials. This exemption was probably included for metal pipes, cable trays and other ductile penetrating elements, where insulation failure in the standard fire test is expected, but fully compliant (fully insulating) systems may be impractical, add additional and restrictive costs that perhaps do not correlate with the additional level of safety or perceived hazards they are mitigating.

Example 2
All fire dampers are exempt from insulation except in specific cases only.

Example 3
Fire doors are all provided with a maximum insulation requirement of only 30 minutes. Again, this is a cost effective and practical exemption, allowing cost effective and reasonable, user-friendly thicknesses of fire door leaves to be used.

NOTE: International requirements for insulation are often waived in Building Regulations and Building Codes.

Multiple Testing of Identical Test Specimens

There have been some claims that multiple testing of identical systems is a common occurrence and that only one successful test yields a valid fire test report. FPA Australia's TC18 committee members are unaware of any evidence to support this claim. Testing laboratories with which TC18 has been in discussion refute this claim. Laboratories have the right and have been known to withdraw test reports and assessments when new information that contradicts their findings is made available. For this reason any laboratory issued assessments are provided with expiry dates. This ensures they are reviewed in a timely manner and only re-issued if still valid to current version of the relevant Codes and Standards.

Conclusions

The Building Code is now performance based and we operate in an environment with Private Building Surveyors (Certifiers). The use of Alternative Solutions and flexibility for practicality and cost effective building solutions are prevalent. Often the Prescriptive or Deemed-to-Satisfy requirements are bypassed. This can cause confusion, especially to those who are not trained or do not understand the application of the "performance-based environment".

Interpretation on Regulations, Codes and Australian Standards are the responsibility of the Building Surveyor and can vary from project-to-project. Although the ABCB (for the BCA) and SAI Global (for Australian Standards) can provide guidance and rulings, typically a Building Surveyor (Certifier) has to make valued judgements and interpretation for many aspects of deeming a total building solution acceptable. Fire resistance ratings are just one of many.

Fire resistance testing and the application of test results and the associated FRLs is a complex area, and manufacturers and suppliers, and the relevant Education Institutions and Trade Associations, need to help the Building Surveyors (Certifiers) to read, understand and interpret the validity or otherwise of fire resistance test reports.

End conditions and penetration type play a big part in the FRL achieved during standard fire testing.

Insulation waiver for penetration seals is common but some thought must go into to where and why. Remember, the Building Code provides the minimum requirements only, not the "be-all or end-all" and there will always be products available with superior performance and in many cases providing full integrity and insulation ratings if required for a specific application or if requested by the consultant.

Test Certificates can be misleading and if there is any doubt, the Building Surveyor should ask for a copy of the full test report or some suitable written confirmation from the manufacturer or supplier.

Independent third party certification or the use of fields of applications from Registered Fire Testing Laboratories may assist Certifiers as it is often impractical to look at multiple fire test reports for all the variations one finds in a real building application.

It is not the industry accepted practice to test multiple and identical test specimens and for laboratories to provide a test report or test certificate for the single item passed. On the contrary, it is not commonplace to retest an identical system without a full explanation of why, and laboratories can withdraw test report and assessment if new information is made known to them. PFT

● One Stop Shop approach helps overcome difficulties on small site

Promat systems used redevelopment of prin

Sydney is home to well in excess of four million residents, about one in four Australians live in the bustling, sprawling capital of the state of New South Wales, the country's most populous.

The location of the very successful 2000 Olympic Games, the famous Sydney Opera House and "The Coathanger", as proud Sydneysiders affectionately call their iconic harbour bridge, Sydney often speaks with a strong voice in economic and social concerns. Urban development, environmental and safety issues are no exception.

The redevelopment of the Devonshire Electrical Substation in Surry Hills, a densely populated inner city suburb, is a typical case in point. Some questions were raised when it became known that the site was slated for redevelopment.

As a matter of fact, Surry Hills is a part of the Bligh electorate which covers a little more than $13km^2$ and a total population of 87,706 people. Its 6,731 persons per square kilometre (about double the Sydney average) makes it the most densely populated electorate in NSW. Little wonder that urban redevelopment and environmental issues can spark some local concern.

Redevelopment of the Devonshire Electrical Substation

Originally built in 1925, Substation No. 175 was a small brick-faced, understated building, typical of those designed at the time to house oil-filled transformers. These were an integral part of the City of Sydney's power grid until the substation was finally decommissioned in 1996.

Located on a $44m^2$ site at the southern edge of the city, Substation 175 sat mutely within an eclectic urban landscape of low scale row housing to the east, a fifteen-storey commercial slab tower to the north and pocket park to the west.

A lightweight, zinc clad addition was grafted onto the substation building, transforming the redundant industrial shell into a miniature city tower. The compact 4.8m x 9m site now holds a street level café and two residential apartments over six storeys.

The habitable rooms within the tower have dual orientation, addressing both the park and street frontages while maximising light and ventilation to the interiors. A carefully calibrated pattern of windows presents a reinvigorated urban façade to the adjacent pocket park.

Counter to the profligate land use characteristic of most low density Australian cities, the Devonshire Substation project intensifies the use of its tiny site, clearly demonstrating that no site need be too small to be used effectively.

Overview of the site's restrictions and potential

The key structural challenges were dealing with the slenderness ratio of the building and satisfying the earthquake code.

In order to provide sufficient rigidity to the structure, the lower three floors are a reinforced concrete frame. The frame is fireproof and stabilises the retained brick perimeter walls. For lightness and speed of erection the upper three floors are a steel frame construction.

The construction period ran from October 2003 to December 2004.

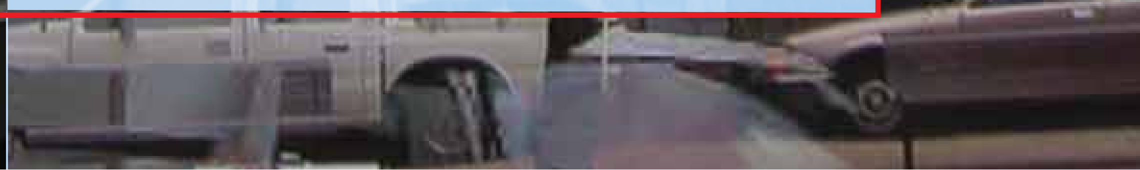
The external walls were required to achieve an FRL of -/90/90. It was also imperative to achieve maximum usable floor space.

Weight was another very important factor for the walls, due to the structural engineer's requirements. Mainly as an acknowledgement of environmental issues, the developer decided to use timber studs instead of steel studs.

Timber, being natural, organic and renewable, has numerous other environmental advantages. It is recyclable, waste efficient, biodegradable, non toxic, plays a major role in combating global warming and provides sustainability for future generations. No other material can match these environmental attributes.

The architects were impressed with the results, the speed of construction, the versatility and the saving in labour, wastage and construction cost.

An extensive range of Promat products such as PROMATECT®-H and PROMATECT®-L were used for the fire protection of perimeter walls and steel structural components.



extensively throughout ne inner Sydney site

Considerations for structure and construction

For light weight construction, 9mm PROMATECT®-H boards were easier to handle than conventional masonry brick work which is a partially wet trade.

The other important factor was the architectural external cladding using zinc sheeting. PROMATECT® board was considered an ideal solution for external cladding.

Due to surrounding businesses and heavy local traffic, limited site access for materials and deliveries was problematic. The ease of handling PROMATECT®-H pallets was therefore seen as another advantage.

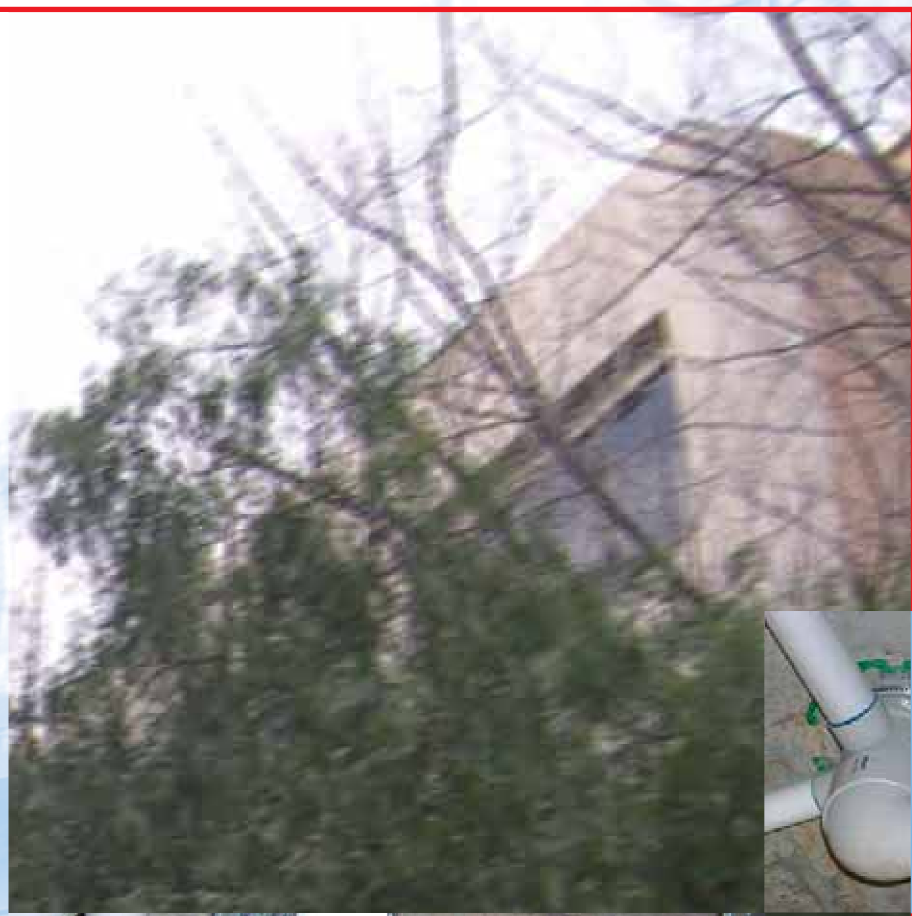
The benefits of Promat applications

The major application consisted of impact resistant and fire resistant external walls with FRL -/90/90. The use of timber studs and 350m² of 9mm PROMATECT®-H on each side plus mineral wool within the cavity met the specifications.

The external face of the wall received further enhancement with a layer of Blue Sarking and then the architectural zinc cladding.

Total wall nominal thickness was established at 70mm thick, relatively slim in comparison to other systems. The Promat system ensured that acoustic problems can be minimised. PROMATECT® is moisture, termite and mould/vermin resistant and wall system weight is low compared to others.

An economical, elegant solution, simple in design and smart in operation, maintenance free and speedy installation with no special requirements and full on-site technical support as well as technical support at the design concept stage were other Promat advantages.



The benefits of PROMATECT® protection for structural steel

All perimeter main structural members were clad with 25mm PROMATECT®-L although some members required 20mm board. Therefore, to maintain architectural lines, the developer decided to use 25mm for consistency.

Promat staff worked with all the parties involved in the concept design, particularly with regard to suitable steel section sizes which would provide an economical system when protected with PROMATECT®-L.

Ultimately these steel sizes, along with the fire protection materials, were required to satisfy requirements of the BCA.

PROMAPAINT® Intumescent Coatings were also used in various locations where space savings were critical.

Promat penetration benefits

PROMASEAL® FlexiWrap was used around air-conditioning pipes and at water lines with combustible lagging which is required to stay in place due to the concerns with condensation on the pipes. PROMASEAL® FlexiWrap allows the lagging to stay in place while maintaining the fire resistance where these pipes pass through fire rated elements.

PROMASEAL® Mortar at riser penetrations, PROMASEAL® Conduit Collars for electrical wiring/conduits, PROMASEAL® Fire Collars/Wall Collars/Green Cast-in Collars, PROMASTOP® UniCollar® for pipe penetrations, PROMASEAL® Acrylic Sealant at control joints/penetrations were just some of the Promat applications installed at the redevelopment of the Devonshire Substation site.

To summarise, Promat can and frequently does work as a One Stop Shop to supply the material and systems specified by BCA requirements as well as offering substantial technical support off-site and on-site during the design and planning and construction phases respectively. In turn, this system can expeditiously help the certification process.

Developer/builder of the Devonshire Substation project is The Trinium Group while the architects were Hill Thalis Architecture & Urban Projects Pty. Ltd. PFT

For your accreditation notes of PROMASTOP®/PROMASEAL® products/systems for AS requirements, please contact us via the Enquiry Form on page 7.

AUSTRALIA SPECIAL REPORT

● Aesthetically pleasing appearance enhances protection

New shopping plaza protects exposed steel with PROMAPAINT®

In the construction industry, the strands of history frequently run long and deep. Worldwide, heritage buildings old and new, intact or in fascinating ruins, attest to this historical legacy.

Take the Light family, for example. Sir Francis Light (1740~1794) is considered by many the father of modern Penang, Malaysia. His son, Colonel William Light (1786~1839) was the first Surveyor-General and founder of Adelaide, South Australia.

Both men were in many ways humble civil servants carrying out their orders of the day. Clearly, father and son were, in their own individual ways, both builders and men of some vision. Builders who, like it or not, left behind indelible footprints.

Colonel Light designed Adelaide along a well-ordered grid pattern. He also surveyed a number of other places which today are integral part of this neat, extremely livable city dotted with numerous historic structures and green belt parks. In fact, many Adelaide buildings and locations still proudly carry the Light family name.

Fast forward to a modernshopping centre in 2005

It is unlikely that neither man would be surprised by the changes wrought by time nor how their two cities have developed and continue building.

Norwood in East Adelaide is an excellent case in point.

A mere 10 minutes from the CBD, Norwood has long been thought of as the city's Little Italy with a pronounced Mediterranean café culture centred on this well-heeled suburb's main street, The Parade. Here and nearby, residents and visitors alike enjoy a smorgasbord of cuisine and specialty shops. These have expanded over the years and now give the area a relaxed, easy-going atmosphere.

Norwood Plaza, a new mixed precinct of shops, offices and services, fits comfortably into the neighbourhood. It consists of a structural steel and tilt up concrete slab system, incorporating a basement car park, first floor tenancies and second floor offices and car park.

As the building's design left the car park steel columns and beams exposed, the architects not surprisingly wanted an aesthetically pleasing appearance.

This factor, in combination with competitive square meter applied rates, called for a steel coating with 60 minute fire-rated protection.

In the case of Norwood Plaza, PROMAPAINT® 60 was chosen to coat approximately 4500m² of structural steel. The car park area was top sealed but the office areas were left as white base-coat with no top seal.

The Old Surveyor-General – his own home destroyed by fire in 1839 – would be well pleased by Norwood Plaza's triumph of form, function and very sensible protection slotting so well into the modern urban landscape, as his statue on Adelaide's Montefiore Hill continues to look out on the built environment he helped create. PFT

For your handbook of PROMAPAINT® Intumescent Coating for the fire protection of steelwork, please contact us via the Enquiry Form on page 7.

AUSTRALIA SPECIAL REPORT

● Wise investment in the future

School expansion programme protects structural steel with PROMATECT® 250 cladding

Sometimes called the City of Spires for many church steeples that punctuate its skyline, the capital of South Australia is better known worldwide as the venue for the famous biennial Adelaide Festival of Arts.

Long recognised as one of the premier arts fests anywhere on the planet, the city's one million population expands dramatically for three weeks in March every even-numbered year as artistes from near and far come to provide internationally acclaimed entertainment for local and foreign visitors.

World famous wines from the nearby Barossa Valley, numerous gourmet food centres and a healthy economy based on agriculture, manufacturing and minerals generally to tend to keep Adelaide happily well-provisioned throughout the year.

Long term protection from a worldwide leader

Kings Baptist College, a private educational institute located not far to the northeast of Adelaide's city centre, had in mind a major increase in the enrolment of its student base. In order to achieve this realistic objective, a new school structure was essential.

Since the building was of steel construction, a decision was made to use PROMATECT® 250 in various thicknesses to protect 400 l/m beams of varying sizes and 180 l/m of square hollow section columns.

The school owners were then faced with a choice to:

a) Provide the steel with an FRL of 60/-/- AND a Fire indicator Panel set up connected to the Metropolitan Fire Service (MFS),

or

b) Provide the steel with an FRL of 120/-/- with no Fire indicator Panel.

Direct connection to fire services

Since the school was already connected to a security company with a smoke detection system also connected to the MFS, the school owners decided instead to use the extra PROMATECT® protection on the steel.

Selecting this course of action meant only a three year repayment period for the extra cladding.

In the final analysis, balancing the purchase of the panel against considerable yearly maintenance costs, it was quite an easy decision to provide 2-hour PROMATECT® protection to the steel structural components. PFT

For your document of PROMATECT® 250 PROMAXON® Technology structural fire protection, please contact us via the Enquiry Form on page 7.

封面内容

● 获奖的澳洲布里斯本（BRISBANE）INB高速公路隧道工程

保全公司为公路隧道创建防火安全保障

布里斯本是澳大利亚第三大城市，拥有超过160万的居住人口。作为昆士兰州的首府，这里拥有舒适的亚热带气候和开阔的视野，吸引了世界各地的游客。

然而，这个城市像世界上其它拥有卫星城的大都市一样都受交通问题所困扰。事实际上，据预测，至2011年，市区将会新增50多万辆车，因此，交通问题将是人们未来生活质量的最大影响因素。

显然，政府解决交通问题的首要策略之一是尽可能提高公共交通网络的效率。总体计划是建立一个穿越城市的公交网络体系，以提供快速、可靠和便捷的公交服务，它将建立于本地区已有重要作用的公交系统上。

公交专线系统将主要用来缓解交通压力

内北公交线路（INB）是整个公交网络中的第二条线路，建成后全长达4.7公里的INB专用公路，将主要用于公交和急救车辆。

公交线路和公交车站的规划和修建需要考虑多方面的因素，它涉及市政规划、建筑规划、电路设计、智能交通系统规划、运输体系规划、地形美化规划、环境艺术和公共艺术。

最终，整个公交线路将包括6条隧道、7个车站、1座高架桥、两个临时公交停靠站和3个车辆转向站。道路整体规划为将来可转化为轻轨线路做了充分的考虑。

第一、 二期公交路线的修建预计将化费 1.35亿澳元，由国家财政和布里斯本市政厅共同承担，其中，国家财政承担1.2亿澳元，布里斯班市议会承担1500万澳元。

整体项目共10部分将分阶段来完成

INB公交线路由10部分组成分阶段完成，修建时间表将要考虑到以下诸因素如：资金供应、与其它主要工程（如市内支路）的结合问题、与主要投资者磋商和对CBD主要事件的考虑，以最大限度减少对交通、商业和居民生活的影响。

INB线路将与布里斯本商业中心区和布里斯本皇家医院相连，在以下地点设立停站点：King George广场、Queensland剧院、Countess大街、Normanby Five-ways、Queensland科技大学、Kelvin Grove学校、皇家儿童医院和布里斯本皇家医院。

此路线还临近以下当地重要的、人口众多的繁华地带：Roma街交通中心、Brisbane Boys文体中心、Victoria Park高尔夫球场和广受欢迎的皇家国家展览协会会场。

INB公交线路的规划与西南公交线路相似，它有助于形成连续、实用的公共交通网络。这条重要和及时的INB线路将会与现有Queen街公交车站连接并与西南公交线路惯通，整个INB也会最终给这个社区带来如下如处：

- 提供可靠、迅捷的公共交通通向布里斯班北部郊区。
- 缩短交通时间。
- 减少运营成本。
- 减少汽车尾气排放。
- 明显改善车辆通行能力。
- 促进城市的可持续性发展。
- 为应急车辆提供通行保障。

保全防火板在布里斯班INB第三段隧道工程中的应用

由于昆士兰州的铁路主干网需要跨越这个公交线路， 于是公路的第三段的起始处就必须修建一条隧道，并且分隔为四个区域。

第一区域： 再次分割为三个区域（1A, 1B, 1C），采用现浇混凝土楼板，底部有混凝土过梁和侧墙的支撑结构，在区段间连接处有适当位移。

第二区域：八根2米高的焊接钢梁，间距1.8m，底部为混凝土转换梁的支撑结构。

第三区域：整体现浇的混凝土楼板。

第四区域：600宽的混凝土过梁支撑于混凝土侧墙的结构， 每段均可独立位移。

昆士兰州政府要求上述的这些支撑结构必须满足4小时碳氢升温曲线下的耐火极限要求， 同时保证跨越的铁路线在火灾过程及之后均能正常使用. 并对防火产品提出了50年质量保证的要求。

开始考虑采用水泥纤维喷射的方案进行结构保护，但是因为这种材料无法适应结构位移的原因，最后放弃了该选择。

Fyeguard成功解决了技术难题

Fyreguard公司是本工程的安装商，保全澳洲公司作为材料供应商和技术顾问， 为了解决这些问题， 进行了大量的技术论证， 最终决定应用PROMATECT®防火板的保护技术。并且，施工段要求使用三种不同的防火保护方法：

区域1和区域4的混凝土结构防火保护

采用2层15mm厚的PROMATECT®-H，通过锚栓并加上1.5mm厚垫片固定在混凝土表面上，可以防止挤压防火板产生裂纹。在区域1中的区段连接处都包含有一个由PROMATECT®-H板条加工成的适应位移的防火节点设计。

区域2：钢结构的防火保护

目前还没有足够的试验数据来满足对上述区域的防火保护要求。基本的规定要求是： 该钢结构防火保护系统，在耐碳氢升温曲线下进行四小时的耐火试验， 结构表面的温度和结构变形都控制在一定水平。

除了要求满足钢结构自身的位移，另外也需要能承受周期性检修时的人行荷载。通过选用25mm的PROMATECT®-L和9.5mm的PROMATECT®-S复合层防火板，就很好的解决了抗火与承受人行活荷载的问题。

在澳大利亚威灵顿消防研究中心，技术人员建造了一个缩小尺寸的混凝土隧道模型（并设置检修板）， 对这个结构进行了特别的防火测试， 同时活荷载的试验在经独立的结构工程师进行计算后也相应进行。

经过最后统计，INB隧道第三段项目一共应用了440m^2的9.5mm厚度的PROMATECT®-S板，630m^2的25mm厚PROMATECT®-L板，和2250m^2的15mm厚PROMATECT®-H板。

Fyreguard公司一共用了八周时间安装完成结构防火保护系统的龙骨和板材，在板材安装完成后， 整个隧道顶板均被喷涂成了青黑色。PFT

Legendary name for Southern Hemisphere's highest skyscraper

World's tallest residential complex uses PROMASEAL® fire collars and IBS™

"Eureka" or "I have found it!" is said to be the word uttered by the Greek mathematician and inventor, Archimedes (287-212 BC), when he discovered a way to determine the purity of gold by applying the principle of specific gravity.

More to the point and – given the powerful almost magnetic hold gold has on most people – perhaps not so surprising, Eureka is a place name and a significant signpost in the folklore of Australian history.

The Victorian goldrush of the 1850s attracted thousands of adventurers from all over the world. As the rich veins of ore around Ballarat eventually played themselves out, dissent grew amongst the miners.

In 1856, a small group of armed men built the Eureka Stockade. Their aim was to reform unjust laws and to establish a government of constitutional monarchy.

The then colonial government hastily despatched troop reinforcements. In the bitter skirmishes that followed, some 20 odd so-called "rebels" and four soldiers were killed. Very few if any of the survivors were ever prosecuted in the ensuing court trials.

Indeed, many apparently went on to prosper in other careers. Neverthess, Eureka has remained an enduring if somewhat ambiguous icon for almost 150 years of the country's continuing development.

A new landmark rises above the Yarra River

Today, the name soars high in an altogether modern context above Melbourne's skyline on the strikingly new Eureka Towers.

When completed by the end of 2005, it will be the tallest skyscraper in the southern hemisphere and the world's tallest residential complex (at least for a short period of time until it is soon surpassed by another building on Australia's Gold Coast).

Located at Riverside Quay in Southbank on the cosmopolitan city's Yarra River, Eureka Tower's slim but elegant profile is already a landmark in Australia's most European metropolis.

Victoria is Australia's smallest mainland state but its 5 million residents make it the most densely populated. Melbourne alone has a three million population which includes the largest Greek population outside Greece, substantial Italian communities and significant numbers of Asians. Melbourne justifiably earns its position as Australia's capital for cuisine and culture.

Known colloquially as the "Big E" amongst tall building aficiandos, Eureka Tower will rise 297.2m above ground (exactly 300m above sea level) and comprises 92 stories.

Extensive use of PROMASEAL® fire collars

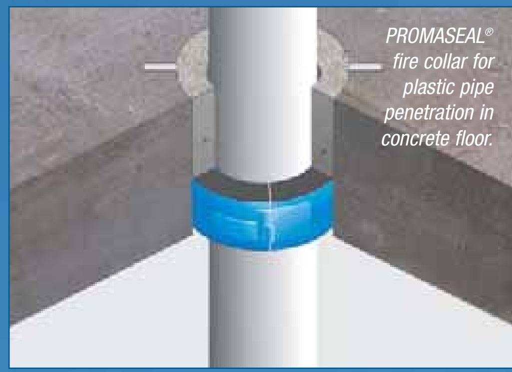
Project Value at Eureka Tower is A$500m and when complete it will contain 556 apartments. Residences will occupy levels 11 to 87. The two lifts servicing the uppermost observation decks will be the fastest in Australia, travelling at nine metres per second, taking just over 30 seconds to reach the top from the ground floor lobby.

Eureka Tower is a joint venture between major developer/builder Grocon, the Fried Family and Katsalidis Group. As the Grocon Group is one of Melbourne's major concrete manufacturers, floor beams of prestressed concrete and floor slabs of reinforced concrete comprised the majority of structural components.

Various PROMASEAL® fire collars were used in wall systems throughout the project.

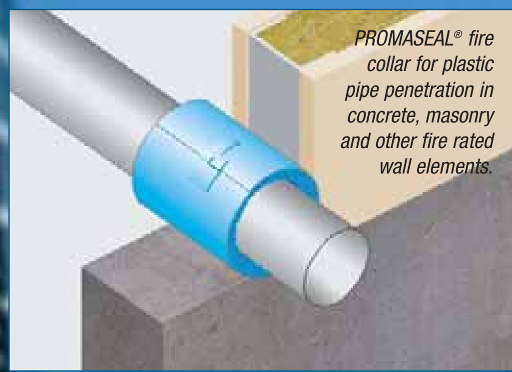
The special Eureka Wall System was designed specifically for Eureka Tower and incorporates Promat's PROMASEAL® IBS™ rod as a deflection head. This wall system was designed to provide high levels of acoustic performance and its usual fire resistance properties. PFT

For your accreditation notes of PROMASTOP®/PROMASEAL® products/systems for AS requirements, please contact us via the Enquiry Form on page 7.

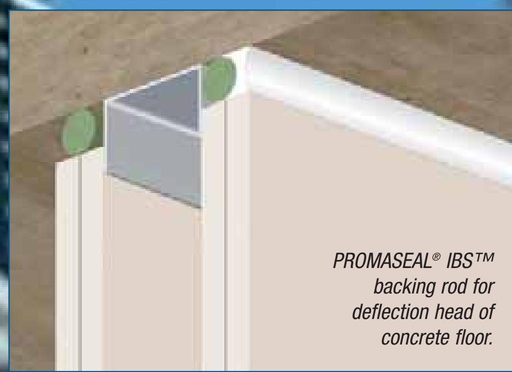


PROMASEAL® fire collar for plastic pipe penetration in concrete floor.

PROMASEAL® IBS™ form strip for joint sealing of walls.



PROMASEAL® fire collar for plastic pipe penetration in concrete, masonry and other fire rated wall elements.



PROMASEAL® IBS™ backing rod for deflection head of concrete floor.

PROMASEAL® fire collar for plastic pipe penetration in concrete floor.

This article was written in association with the kind permission of Eureka Tower Pty. Ltd. in collaboration with Promat correspondents in Melbourne, Victoria, Australia.

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