PROACTIVE FIRE TRENDS

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● Promat once again in the fast lane of success

PROMATECT® Wins Chequered Flag At Shanghai's New Formula 1 Racing Circuit

FEATURES

Good times or bad, past and present's Shanghai has always figured large in popular imagination.

In the mid 20th century, it was known far and wide for its legendary high life, conspicuous wealth and foreign concessions in dramatic contrast with grinding poverty, feuding war lords and political intrigue.

Even when the winds of change swept the People's Revolution to power and an era of enormous social, economic and political correction, Shanghai retained its position as China's leading centre for culture, science and industry.

Today, two decades after the world's most populous nation decided it had little pragmatic choice but to re-open its doors again to the outside world, Shanghai demonstrates clearly why it is the country's most energetic engine of growth.

In this bustling business boomtown of some 17 million residents, many believe that the city's traditional entrepreneurial, "can do" spirit will do much to connect China effectively with the modern, globalised world.

In the future, as in the past, if it happens at all in China, it will likely happen first in Shanghai.

As this energetic supercity continues to progress – its new high rise commercial centre in the satellite city of Pudong, is a perfect case in point – Shanghai's agenda naturally recognises the importance of other developments.

It therefore pushes ahead with a number of international standard projects.

The new Formula 1 Racing Circuit is a good example of Shanghai's desire and ability to compete at a global level.

Shanghai Racing Circuit – a landmark for China and for motor racing – soon to be inaugurated

The Shanghai International Circuit - the first in China to be included in the glamourous FIA Formula 1 World Championship calendar – nears completion.

The circuit's inaugural international event, the first Chinese Grand Prix scheduled for 26 September 2004, will be the 16th of the F1 season's globetrotting 18 races.

The participants in Shanghai will include all the high profile brand names associated with international racing – Ferrari, Mercedes McLaren, Williams BMW, Jaguar, Renault and others. As always, the audience is huge. Global television rights create instant recognition for man, machines and location.

In fact, it will mark the fulfilment of an ambitious project which began at the end of 2002 – official groundbreaking took place on 17 October – and continued with a 3000 per day workforce on rotation shifts to ensure the circuit will take its deserved, debut place in the exciting world of international racing.

The sheer size of Shanghai's new F1 Circuit will likely overshadow many other circuits currently on the World Championship slate.

It incorporates 14 wide-ranging corners – a challenging balance of left and right handers – which combine to form a 5.45 km lap demanding much of driver and machine alike.

The circuit's distinctive two dimensional shape, particularly when viewed from height, is reminiscent of the Chinese calligraphy symbol "shang" which, in turn, translates as "high" or "above".

Computer model estimates indicate that current generation Formula 1 cars will confidently lap the track in about 1m 34s, an average speed close to 205kph. On the longest (1175 metre) straight, linking turns 13 and 14, cars could reach a maximum speed in excess of 325kph.

Continued on page 2

A Simple Matter Of More Security?

When the late British Prime Minister Harold Macmillan made his famous "Winds of Change" speech in 1960 he recognised more than the inevitable, necessary end of empire. It was the dawn of modern new era, one that Marshall McLuhan, the Canadian social anthropologist, would call the age of "the global village", an interconnected, interdependent world in which change would be accelerated and expanded as never before by the widespread use of remarkable new technologies and communication tools. As McLuhan observed, the "medium became the message" and the agent of change.

As we continue to work routinely with many different cultures across various time zones, I am constantly amazed just how quickly the flow of information and, hence, change happen. The old axiom, the only constant about change is change itself, has never been more true. This fact raises some interesting questions, particularly when weighed against a current global situation of some uncertainty.

On one hand, I can definitely say that some change and the speed with which it occurs is simply not good. Sometimes it is better to step back, re-examine, slow down and perhaps even be more questioning in our attitudes. On the other hand, however, when I look at Promat's mission and strategy, particularly from an individual and a corporate business perspective, I am absolutely convinced that whatever we can do to bring more security, more confidence and more stability to the sometimes chaotic world we live in, is definitely the right way to go. For ourselves and for the communities we live and work within.

The same idea naturally applies with some accuracy to sustaining high professional business standards and services as to anything else. This why we have taken this issue of PFT, our proud thirteenth by the way, to look at a balance of new developments and old but still rather important issues.

For example, our cover story opens on the exciting world of high octane Formula 1 motor racing. This time in Shanghai. It is China's first purpose built motor racing circuit of international standard. Later in the year the first ever F1 event will be held here in the word's most populous nation. Promat's small but significant contribution will help to make this brand spanking new venue a little more secure from fire risk.

If a person's eyes are the windows to an individual's soul, then a plethora of doors in a building are the main life-giving arteries to many a business and home. Their importance and their security are often overlooked. So, on page 2 we take a look at various aspects of Fire Resistance Fire Doors.

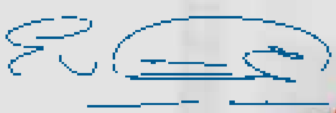
On pages 4, 5 and 6 we present a fairly detailed overview of another frequently ill-informed matter, Fire Protection For Cables. No building these days is without its own fair share of electrical cables, but how often do we think of the fire resistance of these important energy-carrying links? Little understood until now, cables are beginning to assume a whole new level of attention they clearly deserve, from occupants and fire science professionals alike. Also on page 6 is a review of our latest comprehensive marketing tool, the full colour Promat Handbook which is also now available in a convenient interactive CD.

On page 7, there's the usual multilingual feature while on page 8 a brief but informative article on Standard Fire Tests For Services rounds out a colourful and eclectic PFT13.

I am inclined to believe that we all need more reassuring security around us these days. Promat's continuing pursuit of excellence, based on commonly accepted scientific standards, is not just a contributing factor to Promat's success in the world of fire protection but a way of life and work that can be emulated in many other aspects of modern life.

Don't hesitate to put Promat's considerable expertise to work for you. My Promat colleagues and myself appreciate any opportunity to help you feel more secure about the future.

Keep Our High Standards Flying, Upwards and Onwards!



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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.

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PROMATECT® Wins Chequered Flag At Shanghai's New Formula 1 Racing Circuit

Continued from the cover

The new purpose-built Shanghai F1 Circuit is designed for success – a mecca for all motorsports

The developer and local authorities aim to make Shanghai a metropolis for international standard motor racing, a must for drivers and teams.

The Shanghai Circuit is therefore purpose-built, dedicated to multi-functional motorsports and confident that it will attract sponsors and investors, domestic and foreign alike, in the years ahead.

The designers of the circuit complex have successfully incorporated many elements not just into the shape and technical specifications of the track but also integrating the various support buildings and services.

As Formula 1 racing symbolises speed and high tech performance like no other sport, the designers have integrated modern hard-edged technology with nature and history. These are expressed in the use of newly interpreted and continuing traditions in architectural form, colour and building materials.

The main off-track focal point of the circuit is, understandably, the main grandstand, capable of seating 29,500 spectators. Located as usual at the start finish line on the main home straight, the Shanghai circuit's grandstand is visually and physically linked to other buildings on the other side of the track.

Striking architectural style combines Eastern and automotive features

The most striking architectural feature of the main grandstand is the two red stair towers creating a distinct entrance, akin to "guarding the gate" in the style typical of China's traditional entrance lions.

A soaring roof structure in the shape of a "wing" echoing the performance-enhancing aerodynamic foil common to most high speed racing cars, links both ends of the grandstand with glass towers on top of the buildings on the other side of the track.

In this way two sets of "gates" are formed, symbolising Shanghai's role as a gate to the world and the city's new role as a gate to exciting world of car racing.

In fact, the "wings" spanning across the track actually house important racetrack features such as restaurants and a media centre.

Other structures in the complex feature the pitbuilding, the control and administration towers.

Nearby but elsewhere within the circuit complex are the teambuildings.

Sensitively arranged along a Shanghai Yu-yuan Garden theme, team accommodation floats above a man-made pond – islands of peace and meditation in the roaring fast world of F1 racing.

Top to bottom:

The red towers – symbolic "guards of the entrance/gate" of the grandstand of Shanghai's new F1 circuit – feature PROMATECT® partitions in compartments around the towers.

Construction work in progress in a typical compartment within the towers.

A view of roof tops close to the media centre where PROMATECT® has been used extensively in ceilings.

Demands for quality reflected in quality of essential proactive protection

In view of the historical significance of the Shanghai F1 Circuit, the developers had to be mindful of many factors. Uppermost were build quality, environmental awareness and safety issues.

At the core of F1 are concerns for speed and safety and cutting edge automotive technology which tolerates no compromise.

Aware that similar demands and needs would be expected of F1's newest international standard racing circuit, Shanghai F1 developers realised that quality could not be undercut.

Their expectations found sympathetic resonance with Promat, a company that shares many of the same philosophies in its industry-leading role in fire sciences technology for the built-environment.

Its fire-rated performance, workability and ease of installation made PROMATECT® fire protection technology an obvious and perfect choice for extensive use in different applications at the Shanghai F1 Circuit.

PROMATECT® was specified and seamlessly integrated into the partition systems of the media centre, the air restaurant and at other partition locations around the two entrance towers.

PROMATECT® systems were also employed in the ceilings of the media centre and the air restaurant, as well as in self-supporting ducts in the two entrance towers.

Cladding for other ducts in the two entrance towers and for structural steel components in an elevator well also received PROMATECT® protection.

Apparently, the project's architect and owner chose Promat systems because they understand that Promat is a leading worldwide fire specialist. For them choosing Promat systems represents improved safety.

The extensive use of PROMATECT® fire protection technology also reconfirms once again its suitability for even the most demanding applications, like the world's newest international F1 circuit in Shanghai. PFT

Insight into an often overlooked subject

Evaluating Fire Resistance Of Timber Door Fire Doors Mounted In Steel & Timber Door Frames

Prepared by **Jasdeep Singh**, Technical Support Engineer, Promat International (Asia Pacific) Ltd. (India Representative Office)

The design and construction of fire resisting doors is a complex operation involving the skills and specialised knowledge of architects, fire experts, door manufacturers and ironmongers.

The architect is the first in the line of those concerned with the provision of fire doors. It is he who ascertains the requirements of the building users and decides where and in what form doors will be required. The architect also assembles the specialised information from other experts into a design for the complete door and arranges for the doors to be manufactured.

Promat has been involved in quite a few recent fire tests on doorsets. These have always used a timber doorset with door frames of either timber or steel.

The fire resistance of doorsets applies to complete doorsets including the leaf, frame, furniture, the fit of the leaf in the frame, the method of fixing to the surround construction and the type of surrounding construction.

The fire resistance of doorsets with timber leaves can vary greatly depending on the use of timber frames or steel frames and the restraint afforded to the frame by the surrounding construction.

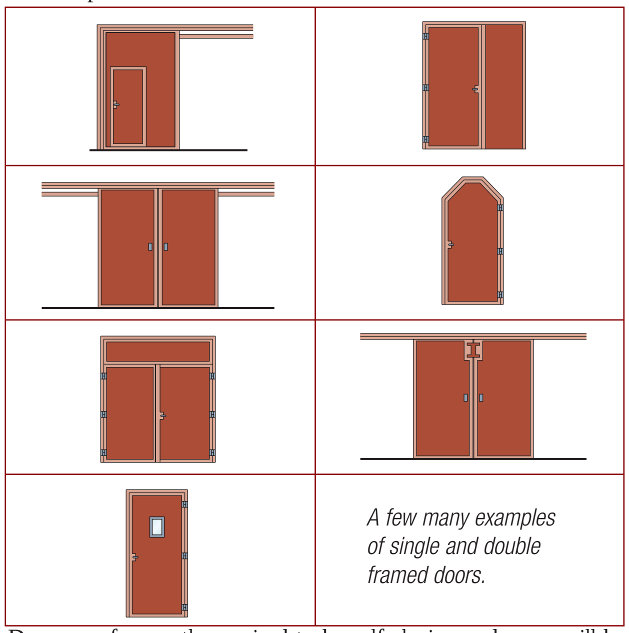
Basic principles for fire testing fire resisting doors

In most respects Fire Resisting Doors are ordinary doors with certain additional features. It is hoped that for most of their life they operate as such.

Fire resisting doors have to be opened, closed, locked, latched, bolted, cleaned and maintained just like any other doors. They need to be able to resist the wear and tear of normal use, their robust construction capable of being fitted with a wide range of glazed panels and ironmongery. They frequently need to be protected from damage.

The planning of a building involves the arranging of circulation routes, allocating space and rooms with all their servicing needs. It is then necessary to locate openings and/or doors to provide access from space to space.

Single or double doors must give suitably sized clear openings to permit the passage of pedestrian and vehicular traffic. Doors must be hung or pivoted to open and close to suit the requirements of the occupants.



A few many examples of single and double framed doors.

Doors are frequently required to be self-closing and many will be fitted with locks.

In the final analysis, the performance of the door leaf or door frame and the effect of changing one component can have on other components to the detriment of the overall system means that the matter of fire performance of doors and doorsets cannot be viewed in isolation.

Timber door frames

The risk of premature failure of fire doors due to the distortion of their timber frames can be ignored if the frame has been formed from straight-grained material and is adequately fixed to the surrounding structure.

The rate of charring of timber frames is of much greater significance and is generally closely related to timber density.

Commercially available softwoods with densities of at least 420kg/m³ have been shown by test to be suitable for door frames for assemblies with fire resistance ratings of FD 20 and FD 30.

Certain 54mm thick door leaves with a fire resistance of FD 60 have been successfully tested using frames of selected softwood.

It is more usual however, for timber with a slower charring rate to be used for this application, normally hardwoods with densities of 650kg/m³ or greater.

FD 60 assemblies incorporating leaves of 44mm thickness will be less tolerant of lower density frames and the timber density used for thinner leaves becomes much more critical.

Timber based door frames for assemblies that are designed to provide fire resistance periods in excess of 60 minutes will either be fabricated from very high-density timbers or incorporate proprietary protective materials in the construction.

The impregnation of softwood with flame retardant salts has not shown in tests to make a significant contribution to the fire resistance of timber framed fire doors.

Door frame material should, therefore, be free from wild grain and have a density and cross section of at least that used in the validating test or in any other approved specification.

A change in door frame specification from the original, which involves the use of a timber of a greater density or cross section, is acceptable without the need for further test evidence or assessment.

Steel door frames

Steel expands when heated, and furnace temperatures in excess of 800°C and 900°C are experienced during 30 minute and 60 minute exposures respectively in the standard fire resistance test.

Steel door frames will have one cooler edge on the unexposed face of a doorset under test while the other edge will be exposed to the fire.

The heated edge of the frame will expand with such force that the frame members tend to bow in towards the furnace at mid height.

The very different thermal behaviour of timber will produce different and often opposite, modes of distortion or bowing in the timber door leaf.

The result is that the edge of the door leaf will tend to separate from the frame, contributing to loss of integrity of the door assembly.

For periods of fire resistance of up to 30 minutes some composite metal frames incorporating steel liners, often forming part of a partitioning system, have successfully incorporated timber based door leaves.

Frames for doors with a fire resistance rating of 60 minutes invariably require a method of controlling their distortion.

Most commonly, the steel frame sections are infilled with cementitious material or are securely fixed to a masonry surround with masonry passing into the rear of the frame section.

As well as providing a mechanical restraint, intimate contact with masonry produces a heat sink effect, further assisting in reducing distortion of the steel door frames.

Filling the steel frame with mineral wool will tend to reduce the fire resistance of the door assembly as the presence of the mineral wool eliminates any heat sink effect of the surrounding construction. Mineral wool filling also tends to increase the temperature difference of the steel frame between the fire and non-fire sides thus increasing the bowing forces.

Steel door frames should be of the type tested and fixed in accordance with the tested condition.

The relatively high thermal conductivity of steel will mean that there may be a possibility of the unexposed face of the steel frame reaching temperatures sufficient to ignite timber, e.g. the unexposed face of the door leaf.

The other main problem associated with a steel frame having reached several hundred degrees Celsius by conduction is the effect upon the intumescent or heat activated seal used to protect the leaf to frame clearance gap.

Intumescent seals work satisfactorily when bearing against timber surfaces.

The insulating properties of timber will mean that even during fire exposure the expanding seal will be acting against the uncharred timber surfaces of door leaf edge and door frame towards the unexposed face of the doorset.

However, in the case of a steel frame the seal will be acting against a steel surface heated by thermal conduction. This may degrade the seal more rapidly, thus reducing the period for which the seal remains effective.

Thermal expansion of a steel frame will lead to an increase in its internal dimensions (i.e. the opening size for the door leaf) which in turn leads to an increase in the leaf frame clearance gap. This places a greater performance requirement on any seal used to protect this junction.

Intumescent seals do not expand indefinitely and the specification for such seals in this application is normally greater than would be used with timber frames.

Because a steel frame has formed part of a door assembly with a timber based door leaf and achieved a satisfactory fire test result it does not follow that the steel frame is suitable for combing with any other timber based door leaf.

Timber based door leaves should not be hung in steel frames unless substantiated by specific test evidence. Such door assemblies do not easily lend themselves to assessments.

The surrounding structure or wall should be taken into consideration for the construction of a fire door.

Compatibility of door frames with surrounding structure

The surrounding structure or wall into which a fire door is built influences the fire performance of the assembly only if excessive distortion is likely as a result of fire exposure. This is a significant consideration where steel frames are used.

Masonry walls and non-loadbearing timber stud walls are reliably stable and generally present few problems. Some partitions may be prone to distortion. In some instances a timber door frame can limit the distortion of a steel stud partition.

The most problematic combination can be timber door leaf in a steel frame, within a steel stud partition.

The steel door frame or steel stud partition will undergo both a certain degree of expansion and/or distortion during fire exposure and this cumulative movement may not be tolerated by a timber door leaf.

Mouldings can be affixed to the surface of the doorset using adhesives and/or mechanical fixings. It should be noted that penetrating the doorset with screws or nails to fix mouldings will not impair the fire performance of the doorset.

Unless differential distortion between the wall and the door assembly is unlikely, the compatibility of a door assembly with an adjacent wall should be determined by test. PFT

For a technical manual of Promat Asia Pacific's Fire Door Series, please contact us via the Enquiries Form on page 7.

A review of some of the methods used to test cables for their fire resistance properties

Fire Protection Of Cables

Stark, often sad, statistics reveal that 20% of all major fires are caused by electrical faults, creating considerably loss of life and property damage. Virtually any building is at risk.

For example, in the UK alone, over a five year period from 1996 to 2000, losses due to fire caused by electrical faults were estimated to exceed USD500 million. Losses in the USA, from just a single business year in 2000, confirm a disturbingly similar pattern that can undoubtedly extrapolated on a global basis.

Such losses can be minimised if not avoided if the fires that caused them are prevented or contained. While most buildings are compartmentalised to reduce the risk of fire spreading throughout the building, each compartment must be fully serviced. These services are often cables that breach compartment walls and floors, in turn jeopardising their fire containment function. Obviously, concern must also be directed to certain electrical systems that must remain functional for a period of time in the event of fire to ensure a full set of life safety systems.

Most active fire protection systems such as fire alarms, emergency lighting, fire extinguishing systems and smoke extraction fans – as well as fire service elevators in high-rise buildings – clearly require uninterrupted electrical current to operate effectively. If these cables are damaged, the outcome is invariably expensive and too frequently tragic.

Failure of cabling under fire conditions invariably leads to breakdowns in detection and communication equipment, causing difficulties and delays in fire services reaching the affected parts of these tunnels.

In the event of fire, it may be vital to the safety of the structure's occupants that essential electrical systems remain functioning until they have escaped. Such systems therefore require protection from fire for a specified period of time and should include:

- Electrically operated fire alarms;
- Emergency escape route lighting;
- Electrically operated extinguishing systems;
- Smoke extraction vent systems;
- Power supply for fire service elevators in high-rise buildings.

In addition to protection from fire outside the duct, it is also necessary that any fire within the duct be contained, e.g. when cable sheathing ignites due to an electrical overload.

A suitably designed duct will therefore:

- Prevent the propagation of fire from one building compartment to another,
- Assist in maintaining escape routes,
- Ensure the continuing operation of other services within a common service shaft,
- Reduce damage to localised areas,
- Contain smoke and toxic fumes from burning cables.

Why protect cables?

It is usually the responsibility of the M & E consultant to ensure that services function. Much depends on this simple assumption. However, due to the nature of their training and product knowledge, M & E consultants will almost certainly consider the use of fire resistance cables.

Some manufacturers claim that their fire resistance cables can last for three hours in a fire. While these cables will operate under fire conditions to their test standard, e.g. BS 6387 and/or IEC 60331, most cables seldom perform anything like the "claimed" time periods under real fire conditions.

Secondly, in addition to keeping essential electrical cables in working order, it is also vital to prevent fire transmission from one compartment to another. Another way of looking at this particular aspect is to "localise" damage to a specific area. Most cable sheaths are made of plastic with an inherent, high potential for combustion. Very often it is the cable sheathings that are responsible for distribution of fire in a building.

Thirdly, in addition to fire containment, it is also necessary to make sure that the cables produce as little smoke as possible or no smoke at all and no acidic gases. In a fire, smoke kills faster than heat, flames or structural collapse.

Services such as electrical cables are frequently installed in corridors, mostly for reasons of convenience. It is not uncommon that they are sub-distributed into adjacent rooms. The same corridors also serve as access routes and fire escape routes.

If the cables catch fire, the smoke produced will impede escape by obscuring emergency lighting and exit signs. Oxygen levels are dramatically reduced while toxic gasses such as carbon monoxide (CO) can escalate rapidly, usually a life-threatening combination.

Acidic gases will also cause severe damage to construction materials and the interior of the building. Even quite small fires can produce enough acidic fall-out to destroy electronic equipment in buildings.

Effects and hazards of cables in a fire

Almost all cable insulation coverings are made of plastic, mostly polyvinylchloride (PVC). Other plastics such as polypropylene, polyethylene and synthetic rubbers are also used. The risk associated with these plastics is that, on intensive combustion, they may produce toxic and corrosive fumes that can include particulate, unburned fuel, water vapour, carbon dioxide and carbon monoxide.

The "C" in PVC – chloride – is not a pleasant substance. When burned and combined with water it forms hydrochloric acid (HCL) – a colourless, poisonous gas with an unpleasant, acrid odour. This halogen gas is fatal to humans and sensitive electrical equipment, such as found in computers.

Any witness to PVC cables burning under "controlled conditions" can easily imagine the effect of dense acid smoke disorientating panic-stricken individuals trying to escape from a burning building. Smoke and toxic gases can have wide-ranging effects on people, most are potentially tragic.

Studies on the causes of fire deaths indicate that carbon monoxide (CO) poisoning is the culprit for approximately one-half of total fatalities. Direct burns, explosive pressures and various other toxic gases account for the remaining half.

Due to the above drawbacks of the usual PVC sheath, alternative halogen-free sheath materials have been developed. The benefit of halogen-free sheath cables is a better fire performance than currently possible for PVC cables. However, halogen-free materials are normally more expensive than PVC which continues to be widely used due to lower pricing and lack of awareness as to how PVC behaves in fire conditions.

Only a reduction in smoke and acrid fumes can assist in the evacuation and fire fighting process. It is therefore imperative that some form of smoke extraction system is included within a building's design.

The very nature of the gases and particulate matter that any system is required to remove from the location means that duct or extraction systems need to be constructed in a way that is itself resistant to fire.

Requirements by building codes

Most building codes stipulate circuit integrity during fire for cables that supply essential services and equipment. The ability of flame spread on the cable's sheath, the amount of smoke emitted by the PVC insulator and halogen/acidic gases released from the cables are also taken into consideration.

The UK and Europe

In the United Kingdom and Europe (except for Germany) there is no requirement to have fire rated enclosures for electrical cables. In those countries where fire safety engineers are dominant – and where there is no statutory requirement to fulfil – building codes exist only to provide guidance to the fire engineers. It is then the fire engineers' task to request adequate fire protection.

Fire rated enclosures to cables are not popular in many countries due at least in part to heavy lobbying from electrical cable manufacturers for their "fire resistance cables". These cables provide certain degree of fire resistance – are measured against a test method that uses Bunsen burner with a specific flame pattern and must maintain their function of transporting electrical current for a given time – are widely specified and used within the construction industry. If cables are protected with enclosures it is on a voluntarily basis.

Asia Pacific Region

Many countries in the Asia Pacific region have at least one statutory building code to follow. Building designers and architects must strictly adhere to their local building code. Local standards such as Malaysia Standards and Singapore Standards have been or are in the process of being developed. Generally these local standards are very similar to the British standards from which they were initially developed.

MALAYSIA

In Malaysia, the building code being referred to and practiced is known as Uniform Building By-laws. A guide on fire protection in buildings is also available for the building designers and architects, and should be read in conjunction with the By-laws code. For essential wiring and cables to maintain functional in a fire, this guide refers to BS 6387 standard.

SINGAPORE

Singapore's Code of Practice for Fire Precautions in Buildings 1997 provides statutory requirements and guides to the building designers and architects. In this code, cables that are required to deliver electrical current to essential services are to be of fire resistant type that complies with the local standard SS CP 299, essentially a derivative of BS 6387.

For the rapid transit system in Singapore, as above ground and underground facility, a separate code "Standard for Fire Safety in Rapid Transit Systems" was made available by the transport authority. This standard was developed for the new Mass Rapid Transit (MRT) stations where NFPA 130 "Standard for Fixed Guide way Transit and Passenger Rail Systems" was adopted as a design guide.

In general, the standard requires that any cable installation in the train stations and train ways shall be of fire retardant or fire resistance type. The cables shall also be of low-smoke and halogen-free type. Fire resistant cables shall comply with the local standard SS CP 299 for at least 2 hours. However, if these cables happen to pass through an emergency escape passage in the enclosed stations, it shall be encased in a fire rated construction.

Requirement such as shock resistance is necessary when the fire rated construction is sited in a Civil Defence (CD) shelter area. A CD shelter is where the public can take refuge during a civil defence emergency.

CHINA

In the National Standard of the People's Republic of China, the Code for Design of Building Fire Protection, GBJ 16-87, the following guidelines are followed regarding the electrical cables supplying current to the fire fighting equipment.

- If the cables are required to be concealed, they shall be enclosed within a non-combustible structure of minimum 30mm in thickness.
- If the cables are to be exposed, they shall be protected in metal conduits and fire protection measures must be taken into consideration.
- A cable with flame-retardant insulator may not need to be protected in metal conduit. However, it shall be laid in a cable channel.

An overview by **Ian Holt**, Regional Technical Manager, Promat International (Asia Pacific) Ltd. and **Lai Boon Keong**, Technical Advisor, Promat Building System Pte. Ltd.

HONG KONG

The Code of Practice on Building Management and Maintenance requires electrical cables and similar installation in staircases/lobbies to be enclosed by a fire resisting wall or duct. Cables for public telecommunications and broadcasting should also be protected against any fire risk.

INDIA

The National Building Code of India (NBC) demands that essential cables that breach compartment walls and floors be protected by enclosures of fire resistance of not less than two hours.

AUSTRALIA

The Building Codes of Australia requires that electrical cables which supply a main switchboard or substation within a building must comply with either AS/NZS 3013: 1995 or AS 1530.4: 1995 for 120/120/120 (120 minutes of stability, integrity and insulation).

AS/NZS 3013: 1995, Electrical installations, classification of the fire and mechanical performance of wiring system, certifies circuit integrity, impact strength and water hose tests while AS 1530.4: 1995, Methods for fire tests on building materials, components and structures, fire resistance tests of element of building construction certifies stability, integrity and insulation criteria.

Fire related testing standards for cables

There are many different international test standards, which show the performance of preventive systems. For most, there are four requirements:

- extension of the cable's function under fire conditions,
- non or low flame propagation,
- non or low smoke emission, and
- zero halogen acid gas.

Table of International Standards for assessing the fire performance of cables

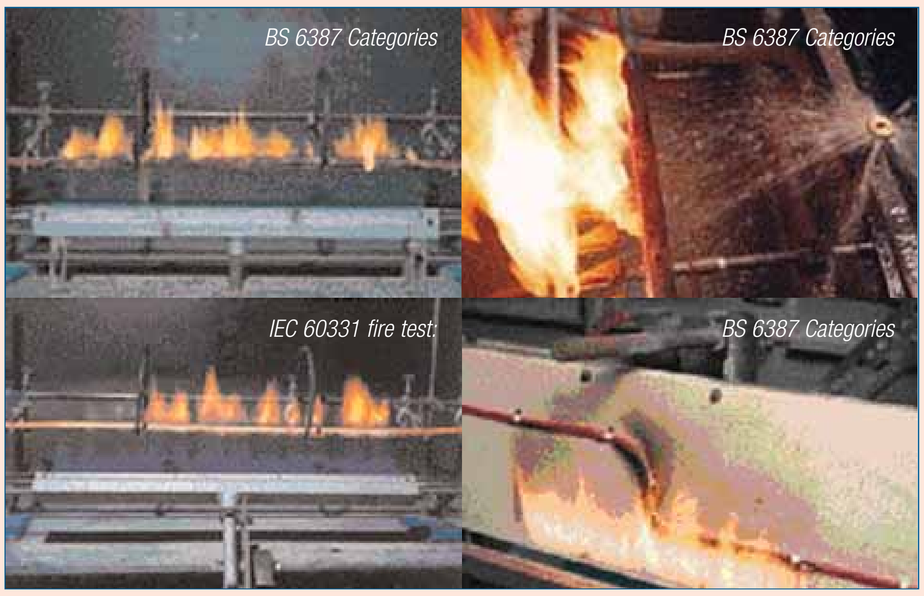
STANDARD NUMBER	TITLE	TEST SPECIFICATION
IEC 60332 - 1 & 2	Tests on electric cables under fire conditions - Part 1 & Part 2.	Flammability
IEC 60332 -3 series (supersedes BS 4066)	Tests on electric cables under fire conditions - Part 3: Test for vertical flame spread of vertically-mounted bunched wires or cables.	Flammability
AS/NZS 1660.5.6: 1998	Test methods for electric cables, cords and conductors - Fire tests - Test for combustion propagation.	Flammability
EN 50265 - 1 & 2 series	Common test methods for cables under fire conditions - Test for resistance to vertical flame propagation for a single insulated conductor or cables - Part 1 & Part 2.	Flammability
EN 50266 - 1 & 2 series	Common test methods for cables under fire conditions - Test for vertical flame spread of vertically-mounted bunched wires or cables - Part 1 & Part 2.	Flammability
ASTM D 5537 - 99	Standard Test Method for Heat Release, Flame Spread and Mass Loss Testing of Insulating Materials Contained in Electrical or Optical Fibre Cables When Burning in a Vertical Cable Tray Configuration.	Flammability
UL 1666	Standard for test for flame propagation height of electrical and optical-fibre cables installed vertically in shafts.	Flammability
UL 910	Standard for test method for fire and smoke characteristics of cables used in air-handling spaces.	Flammability/ Smoke
UL 1685	Standard for vertical-tray fire-propagation and smoke-release test for electrical and optical-fibre cables.	Flammability/ Smoke
IEC 61034 - 1 & 2	Measurement of smoke density of cables burning under defined conditions - Part 1 & Part 2.	Smoke emission
AS/NZS 1660.5.2: 1998	Test methods for electric cables, cords and conductors - Fire Tests - Smoke density.	Smoke emission
EN 50268 - 1 & 2 (supersedes BS 7622)	Common test methods for cable under fire conditions - Measurement of smoke density of cables burning under defined conditions - Part 1 & Part 2.	Smoke emission
ASTM D 5424 - 99	Test method for smoke obscuration of insulating materials contained in electrical or optical fibre cables when burning in a vertical cable tray configuration.	Smoke emission
NFPA 262	Standards. Method of test for fire & smoke characteristics of wire & cables.	Smoke emission
IEC 60754 - 1	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the amount of halogen acid gas.	Toxic/ Acid gas emission
IEC 60754 - 2	Test on gases evolved during combustion of electric cables - Part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity.	Toxic/ Acid gas emission
AS/NZS 1660.5.3: 1998	Test methods for electric cables, cords and conductors - Fire Tests - Determination of the amount of halogen acid gas evolved during the combustion of polymeric materials taken from cables.	Toxic/ Acid gas emission
AS/NZS 1660.5.4: 1998	Test methods for electric cables, cords and conductors - Fire Tests - Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity.	Toxic/ Acid gas emission
EN 50267 - 2-2	Common test methods for cables under fire conditions - Tests on gases evolved during combustion of material from cables - Part 2-2: Procedures; determination of degree of acidity of gases for materials by measuring pH and conductivity.	Toxic/ Acid gas emission
EN 50267 - 2-3	Common test methods for cables under fire conditions - Tests on gases evolved during combustion of material from cables - Part 2-3: Procedures; determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity.	Toxic/ Acid gas emission
BS 6387: 1994	Performance requirements for cables required to maintain circuit integrity under fire conditions.	Circuit integrity
IEC 60331 - 11, 21, 23 & 25	Test for electric cables under fire conditions - Circuit integrity - Part 11, Part 21, Part 23, & Part 25.	Circuit integrity
AS/NZS 1660.5.5: 1998	Test methods for electric cables, cords and conductors - Fire tests - Circuit integrity under fire conditions.	Circuit integrity
EN 50200	Method of test for fire resistance to fire of unprotected small cables for use in emergency circuits.	Circuit integrity
AS/NZS 3013: 1995	Electrical installations - Classification of the fire and mechanical performance of wiring systems.	Circuit integrity
DIN EN 4102-12	Fire behaviour of building materials and building components - Part 12: Circuit integrity maintenance of electric cable systems; requirements and testing.	Circuit integrity
UL 1724	Fire Tests for Electrical Circuit Protective Systems.	Circuit integrity
UL 2196	Tests for Fire Resistive Cables.	Circuit integrity
AS/NZS 4507: 1998	Cables - Fire performance.	General

Continued on the top right

A test definition for BS 6387

BS 6387: 1994 – performance requirements for cables required to maintain circuit integrity under fire conditions covers tests which assess the cable's suitability for installation, such as bending and impact.

Circuit integrity is measured by applying a current along a 1000mm length of cable, where the cable is supported 200mm from each end, i.e. 600mm centres between supports, and the cables are subjected to heat from an elongated Bunsen burner.



The most important tests in BS 6387 are:

- Resistance to fire;
- Resistance to fire and water;
- Resistance to fire with Mechanical Shock.

Fire resistant cable

So called "fire resisting" cables are not new. Some have been around for more than 30 years and are traded under a number of different brand names as fire resistant cables.

Typical uses of these cables include fire alarms, emergency lighting, addressable alarm systems, CCTV systems, emergency power supplies and smoke and fire shutters.

These cables are normally designed to meet the standards for Fire Detection and Alarm Systems in BS 5839 :Part 1 and Codes of Practice for Emergency Lighting in BS 5266 Part 1.

Disadvantages of fire resistant cables

Some problems inherent to fire resistant cables can be summarised as:

- Cost of fire resistant cables can be higher than for normal cables. The cost of installation of fire resistant cables and the special tools and jointing components

Continued on page 6

Fire Protection Of Cables

Continued from page 5

required can mean an additional 15% in installation cost over standard cables. However, certain manufacturers have developed new low cost installation systems that apparently do not require special jointing techniques.

- Size – when subjected to a build-up of heat under fire, the electrical resistance of these fire resistant cables will increase tremendously. They therefore require a greater cross sectional area than a non-fire rated cable to perform to a similar specification. Moreover, the subsequent knock-on effect means larger and stronger support systems for fire resistant cables are required. Support systems which in turn should be protected against collapse in fire.
- Containment – while fire resistant cables will continue to operate for a short period of time, they cannot prevent fire breaching a compartment. Moreover, they have no ability to prevent the cross-over of fire from one affected cable to another unaffected cable. There is therefore a distinct possibility of losing a whole compartment rather than just a single cable.
- Reliability in fire – although some fire resistant cables may achieve the highest standard of BS 6387, they may not last as expected if they are exposed on all sides to a fully developed fire such as the one employed in the ISO 834 time/temperature curve.

BS 6387 only tests a single cable, without any support system, exposed to a gas flame by means of an elongated Bunsen burner. Furthermore, a fresh specimen is used for each of the different test categories, rarely replicating a real life situation in which the same cable may be subjected to flame, water and mechanical shock simultaneously. In addition, the test methods employed do not ensure a significant section of cable is exposed to all four sides by fire. The heat applied during the test is localised to a small area.

Testing fire resistant cables to DIN 4102: Part 12

In November 1999, one particular manufacturer of cable support systems took a step further and approached iBMB Test Institute at Braunschweig, Germany.

They aimed to assess the ability of fire resistant cables in maintaining circuit integrity when subjected to the DIN 4102: Part 12 test procedure.

In the test, there were more than 60 test samples installed in the furnace.

The same manufacturer also used the test situation as an opportunity to test their cable securing mechanisms and cable trays.

The test sponsor, however, did not assert that any of the cables survived the test. Interestingly, it was claimed that one of their fire resistant cables system can achieve circuit integrity E30-E90 (30 to 90 minutes circuit integrity to DIN 4102: Part 12) merely depending on the installation method of the complete electric cable system, i.e. cables in combination with fixing devices.

Fire resistant cables tested to AS/NZS 3013

Another manufacturer has also claimed that their fire resistant cables were independently tested to AS/NZS 3013: 1995 in Melbourne, Australia by Warrington Fire Research.

The highest fire rating classification in terms of the AS/NZS 3013 standard that these cables have managed to achieve is WS52W, i.e. capable of resisting exposure to fire for 120 minutes. The claims extrapolate to a mechanical damage comparable to 15 Joule impact, 1.0 kilo Newton of cutting force and passing the water spray test after a fire test.

However the disadvantages of this cable are as follows:

- Joins or terminations in cables in the fire zone are prohibited. The result is inflexibility of design where there is usually a need to have terminations for connections for emergency lighting, smoke control and detection circuits etc.
- Large bending radius, i.e. up to 10 times the cable's outer diameter when a bend is required. A 44mm diameter cable, for example, requires a 440mm bending radius.

As a result, the space required to install these cables will be very large especially when several of these cables are required to run in parallel to each other. This will restrict the space otherwise used to accommodate other installations such as ducts, pipes and other cables.

Basic principles of cable ducts

Cladding cables to form a ducting is clearly one of the best available solutions of providing cables with effective fire protection. It has been tested successfully. The most complete standard currently available for the testing of the performance of cables under fully developed fire conditions is DIN 4102: Part 12.

There are other systems available apart from cladding systems. These include wrapping with various combinations of ceramic fibres or coating systems. Special care needs to be taken when specifying the latter to ensure the system is capable of a performance that will maintain cable function in the event of a fully developed fire. On close examination many coating systems in fact only offer to retard the spread of flame across the surface of the cable jacket.

Other considerations

Other factors need to be considered when determining the correct specification to ensure the cable duct system will provide the required fire performance.

In fact, there are three main purposes of a cable duct system enclosing standard cables:

- To maintain function of essential cables in a fire emergency;
- To prevent fire, smoke and toxic fumes propagation;
- To ensure the fundamental principles of compartmentation are sustained.

Containment of fire, smoke and toxic gases

The other purpose is to prevent the propagation of fire, smoke and toxic fumes from one building compartment to another. This usually applies to internal fire situations, e.g. when a cable sheath ignites due to an electrical fault.

Essentially, a fire rated cable duct helps to keep the fire within itself and prevents the escape of toxic smoke and fumes produced from the cable sheath.

This is often known as fire compartmentation in the passive fire protection context. Fire is kept localised to a particular area and is prevented from spreading to the adjacent compartment/room next to and/or above or below the fire affected area.

The same rationale can be applied to external fire situations, e.g. fire outside the duct, where the fire is kept within the room and prevented from spreading to the next compartment via penetrations at walls and/or floors made by the cables.

Factors affecting current flow in conductors

Conductors are materials that permit the flow of electricity, e.g. copper, aluminium, silver and gold. Copper is widely used because of lower pricing although silver has a better current carrying capacity.

Changes in the conductor's temperature affect the conductor's resistivity to current. The electrical resistance will increase when the temperature in the conductor increases, thus impeding current flow.

The German standard DIN 4102: Part 12 suggests that loss of function of cable systems generally occurs at a temperature of approximately 150°C. This temperature is measured at the cable jacket. However, it is a sensible practice to provide an additional safety factor to reduce the permissible cable jacket temperature.

Promat cable duct systems are designed to ensure that the temperature on the cable jacket does not exceed 120°C.

Prevention of cable ignition

Current flow in a conductor always generates heat. The greater the current flow, the hotter the conductor will get. Excessive current flow will cause overheating and may result from overload, short circuit or ground fault.

An overload occurs when too many devices are operated on a single circuit or a piece of electrical equipment is made to work harder than it is designed to work.

The excessive heat can cause the cable sheath to break down and flake off, creating conditions when the self-ignition temperature of the cable sheath is possible. The cable sheath will ignite without the presence of a flame or fire. Cable sheath material such as PVC, Polyurethane and Polyethylene has a self-ignition temperature between 340°C to 490°C.

Ventilation openings, installed with fire-stopping systems that have self-enclosing capability, are a sensible and advisable heat dissipation provision in a cable duct system.

Design considerations

Correct specifications to ensure the cable duct system will provide the required fire performance must also be taken into consideration.

Required fire exposure

The specification of a cable duct system will depend on whether it is expected to resist external fire or internal fire, or both.

Required fire performance

The most onerous requirement is to maintain the integrity of the circuit(s) when the system is exposed to external fire. If this is not needed, the performance requirements may be reduced by the approval authority to provide only stability, integrity and insulation of the duct system and/or the wall and floor penetrations. On some occasions further relaxation of requirements may be approved. For example, a reduced insulation performance can sometimes be acceptable if no combustible materials or personnel are in contact with the duct.

Supporting structure

The supporting hangers and their fixings should be capable of bearing the load of the complete cable system including any applied insulation material or other services suspended from it. Chemical anchors are generally not suitable.

Moreover, it is usually not advisable to use unprotected hangers if the stress exceeds 6N/mm² and/or if hanger lengths exceed 2m. The hanger centres should not exceed the limits given for the relevant system.

Penetrations through walls and floors

Care should be taken to ensure that movement of the cable system in ambient or in fire conditions does not adversely affect the performance of the wall, partition or floor or any penetration seal.

Other requirements

Acoustic performance, thermal insulation, water tolerance, strength and appearance can also be important considerations. PFT

MARKETING STRATEGY

Introducing the new "ProActive Fire Protection Systems Interactive Compact Disc"

The Digital Assistant for Specifiers

Prepared by **Ian Holt**, Regional Technical Manager, Promat International (Asia Pacific) Ltd.

We have great pleasure in presenting our new tool for specifiers, the "ProActive Fire Protection Systems Interactive CD". This CD is designed to be used as both a sales and a technical aid. The contents of this CD are not the usual compilation of existing brochures in a PDF format masquerading as something new, although all the Promat Asia Pacific literature is indeed available in PDF format within. Rather than this more general approach, Promat International (Asia Pacific) Ltd. have designed a tool which contains the complete and up to date materials relating to most of the Promat Pro-Active fire protection systems available with the Asia pacific region.

This CD includes full presentations featuring Promat systems, with a description of the available FRL, approval details and appropriate testing standards, areas of use of applications, specifications and uses of products, technical specifications of constructions etc. We have included animations showing installation procedures for all our PROMASEAL® fire stopping range, for our board applications of ceilings, partitions, duct systems, both self supporting and cladding to steel ducts etc.

There is a section which includes a series of HTML files that can be used for the calculation of items often required within pro-active fire protection systems, e.g. stress of duct support systems, bending moment and compressive loads for self supporting membrane ceiling applications and many more.

We have, for the users convenience, included full sets of MSDS (Material Safety Data Sheet) files for all products. These MSDS include both long and short form sets specifically for our Australian clients, and other standard layout sets applicable for our other Asia Pacific clients.

Not covered within this interactive CD is our PROMAPAINT® Intumescent Coating systems. These are covered within a separate set of literature and have their own interactive CD, please consult your local Promat office for further information pertaining to PROMAPAINT®.

With the wealth of information contained within this one small disc, the specifier will have everything to hand for immediate access.

This programme will run directly from the CD, thus there is no need to download anything directly onto a PC hard disk. The programme will run on any Microsoft® operating system from version Windows® 98. PFT

For your copy, please complete the Enquiries Form on the opposite page, or consult your local Promat representative. This CD will be available for distribution from June 2004.

封面内容

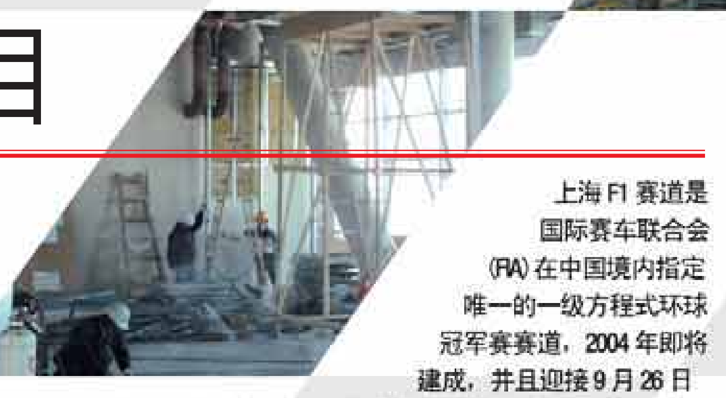
Promat 再次进入成功者的赛道

赢得上海 F1 赛场建设项目

无论时光如何变迁，上海总是一个梦想的舞台。这个东方的浪漫之都，让人联想起的总是浮华的生活，无尽的财富和异域的风情。在经济高速增长的今日中国，她也一直走在文化、科技和工商业的最前沿。中国开放的二十多年来，上海已经清晰的向世界展示了她就是中国经济增长最活跃的动力引擎。在这个有着 1700 万人口的巨大都市，人们锐意进取的商业精神，使得中国积极的融入全球化的经济浪潮之中。

在今天的浦东，鳞次栉比的超级摩天大厦，正见证着这种一直领先的经济活力，而这样的建设过程中，上海几乎都是按照严格的国际标准来要求自己的。

F1 国际赛车场的建设就体现了上海这个都市走向全面国际化的期望，他将是中国赛车运动的里程碑，也将为上海这个美丽的都市再次吸引无数的全球目光。



上海 F1 赛道是国际赛车联合会 (FIA) 在中国境内指定唯一的一级方程式环球冠军赛赛道，2004 年即将建成，并且迎接 9 月 26 日首届中国站大奖赛，是 F1 环球赛中的第 16 站。届时，所有的顶级车队，如法拉利、迈克拉伦、威廉姆斯等都将悉数参加。

在举世瞩目的 F1 赛车场的建设中，业主方和建筑师必须特别留心很多的因素。其中最突出的就是建设质量、环境保护和安全问题。

毫无疑问，对于赛道的速度、安全和控制技术必须依照最严格的国际惯例和标准来执行，绝无折中妥协可言。同样，F1 赛道的业主对于建筑的质量也异常严格。在被动防火系统上，他们选择了 Promat– 业界之翘楚，同时也是最具专业精神的公司。

在 F1 赛车场的建设中，由于 PROMATECT® 产品极佳的防火性能和方便的安装特点，其被大量地运用在建筑的不同部位。

其中 PROMATECT® 防火墙、防火吊顶被精心的安装在新闻中心、餐厅等处；而在两个主入口的楼宇中则安装了 Promat 独特的自撑式防火风管。同时，还有风管防火包覆、钢结构包覆等技术也运用在疏散通道和电梯竖井等处。

显然， F1 建设项目的建筑师和业主之所以选择 Promat 的被动防火系统， 是因为他们信任 Promat 是这一领域最好的专家。 选择 Promat 就意味着最好的保障防火安全。而在这一项目中大量地运用 PROMATECT® 的技术再次确认了这样一个事实：即使是在 F1 国际赛车场这样最严格的性能化项目中，Promat 依然是最合适的选择。PFT

一个易被忽视的技术细节的探讨

作者 [illegible]
Promat International (Asia Pacific) Ltd.

如何评价木质防火门锚固于钢框和木框时的耐火性能

[illegible]

木框木质防火门

[illegible]

钢框木质防火门

[illegible]

门框与墙体的匹配性

[illegible] PFT

[illegible]

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Business URL: http://www. ____________ Email: ____________

I would like to receive:

Just tick

- ☐ Promat Asia Pacific ProActive Fire Protection Systems Interactive Compact Disc (Version 1.0)
- ☐ Promat Asia Pacific ProActive Fire Protection Systems Application & Technical Manual
- ☐ Fire Door Series manual
- ☐ The complete story of *Standard Fire Tests For Services* on page 8
- ☐ *Others (please specify)* ____________

On value scale of 1~5, I would rate this issue a ______ for my reference.

FAX NOW

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This Enquiries Form refers to ProActive Fire Trends Newsletter Volume 7, Number 1 - First Half, 2004

Some commonality but inevitable differences remain

Standard Fire Tests For Services

Prepared by **Michael Wong**, Technical Support Engineer,
Promat International (Asia Pacific) Ltd.

Fire resistance is the ability of a construction or system to pass the criteria set out in Standard Fire Tests. Broadly speaking, a Standard Fire Test in all countries is based on similar tests and heating curves, which have the same or very similar failure criteria. Some exceptions would be Italy, Japan and the USA. Not surprisingly, many countries have their own minor interpretations and variations.

Many countries in Asia Pacific region tend to work with a range of tests under the general heading of AS1530.4 (Australia) and BS476 (UK) which are considered broadly similar in most but, importantly, not all applications.

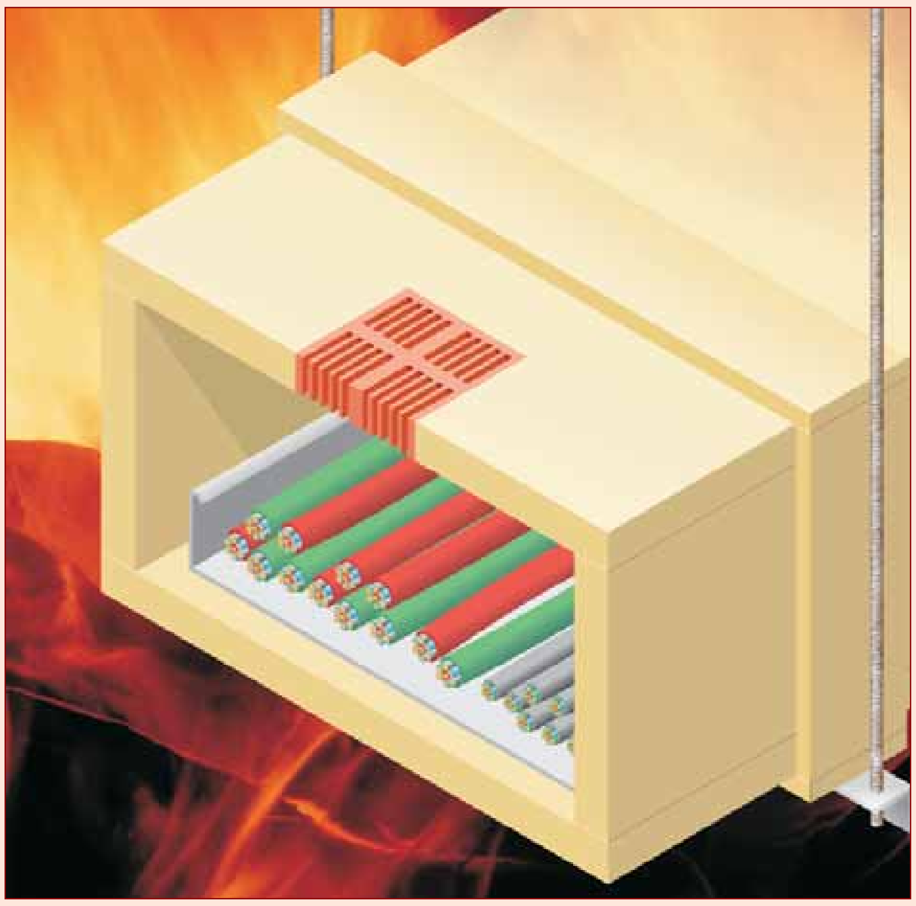
AS4072.1 is also used separately for penetrations seals. At the time of writing there is no Penetration Seal Standard to British Standards and tests penetrations seals are conducted using the general conditions of BS476: Part 20: 1987.

Three test criteria are expressed as the Fire Resistance Level or FRL which are always written in minutes, e.g. 120/120/120 or -/120/120. The failure criteria are Stability (BS) or Structural Adequacy (AS), Integrity and Insulation.

Stability or Structural Adequacy
When collapse occurs or when the deflection or rate of deflection exceeds that specified in the Standard (not taken in to account for penetration seals).

Integrity
When collapse occurs or when cracks, fissures or other openings occur through which hot gases or flames can pass. This includes flaming on the unexposed face but is measured differently in AS and BS (see following note on **Integrity failure**).

Insulation
When the average temperature of the relevant thermocouples attached to the unexposed face rises by more than 140K above the initial temperature or the temperature of any of the relevant thermocouples rises by more than 180K. The 180K rise is used for failure criteria for AS1530.4 and BS476 for penetration seals.



Integrity failure

Failure to AS1530.4 is when there is a gap through which the inside of the furnace can be seen. This can be a very small crack. However, the new draft of AS1530.4 adopts the BS and ISO criteria for integrity failure.

BS476 and ISO834 stipulates that the size of the crack is to be no greater than 25mm diameter or 150mm x 6mm or when a cotton pad ignites when held over the crack (no matter what the size).

Applications

Openings through which services penetrate fire barriers have to be reinstated in such a manner that the fire resistance of the barrier is not impaired.

This means that if a wall or floor has an FRL of 120/120/120 or -/120/120 or even -/120/30, the finished construction must have the same FRL.

Stability (or structural adequacy) of the penetration seal itself is not measured, so the FRL of the finished seal in the above systems would be expressed as -/120/120 or -/120/30 or simply as a 2-hour fire rating.

In fire tests the temperature is taken not only of the surface of the barrier and sealing system but also on the service itself. This temperature is usually taken on the service 25mm from the barrier and 400mm from the barrier.

If compliance with the insulation criteria on the services is requested, the fire test will have to reflect this result.

It is important to note that in some of tests Promat uses a steel mesh to achieve the full insulation on services. Limited insulation is often achieved.

Obviously compliance with criteria especially on metal pipes is difficult as heat is rapidly conducted along metal. However, some fire tests do achieve insulation criteria on services, most commonly on cables and insulated pipes.

All barriers should maintain the insulation criteria on the base barrier system, although this criteria is not called for in all countries.

Insulation criteria

As a general rule of thumb, insulation criteria is waived on services, especially on wall seals, because there is less likelihood of combustibles being close to wall penetrations.

If issuing a certificate for the work, the fire rating should be either expressed in hours or, in the case of FRL, it should be expressed as FRL -/120/- (or similar).

For floor penetrations, it is more reasonable to comply with insulation criteria because combustible materials may be stored alongside penetrations and services are often positioned inside risers that have doors.

In such cases, a steel wire mesh guard – of, say, 20mm x 20mm x 1.0mm mesh – should be fixed to the floor or wall which is spaced away from the service no less than 100mm and is approximately 500mm long.

The length of the guard can be calculated by referring back to the fire test and measuring the temperature at the 400mm position.

Where cable trays penetrate walls or floors, the cable tray itself may be cut so that it does not pass through the barrier. This will significantly reduce the likelihood of heat transfer.

If there's little choice but to comply with insulation criteria on the services, wide variations in costs between systems must also be considered.

Cost differentials are due at least in part to some manufacturers/suppliers who supply and certify a 1 or 2 hour fire rating without quoting the FRL.

If a FRL is to be quoted it should always be expressed as precisely as possible to ensure the end user receives what they are requesting, e.g. similar to -/120/-. An exception is a tested prototype with services that precisely match the application and results achieved during the test give the achieved insulation. PFT

For a more complete and detailed copy of this article, please contact us via the Enquiries Form on page 7.