Promat

PROMINA® 60
General E&M Services Enclosure for Hong Kong

General Description

PROMINA® 60 is a non-combustible matrix engineered mineral board reinforced with selected fibres and fillers. It is formulated without inorganic fibres and does not contain formaldehyde.

PROMINA® 60 is beige in colour and has a smooth finish on one face with a dimple pattern on the reverse face. PROMINA® 60 provides an architectural surface ready to receive most forms of decoration. PROMINA® 60 can be left undecorated or easily finished with paints, wallpapers or tiles. Please consult the Promat Technical Department for more information.

PROMINA® 60 is resistant to the effects of moisture and will not physically deteriorate when used in damp or humid conditions. Performance characteristics are not degraded by age or moisture.

A health and safety data sheet is available from the Promat Technical Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance so no special provisions are required regarding the carriage and the disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should then be disposed by a registered contractor.

Typical Mechanical Properties

Modulus of elasticity, E (BS EN 310: 1993)	Longitudinal Transverse	N/mm² N/mm²	4599 3817
Flexural strength, $F_{rupture}$ (BS EN 310: 1993)	Longitudinal Transverse	N/mm² N/mm²	7.52 5.15
Tensile strength, $T_{rupture}$ (BS5669: Part 1: 1989)	Longitudinal Transverse	N/mm² N/mm²	5.99 5.17
Compressive strength (average, perpendicular on board face) (BS5669: Part 1: 1989)		N/mm²	7.76

Applications

- Ceilings, floors and roofs
- Partitions and external walls
- Fire resistant glazing
- Smoke barriers
- Electrical and mechanical services enclosures

General Technical Data

Product generic description		Matrix engineered mineral board
Material class		Non-combustible to DIN4102: Part 1, BS476: Part 4 and AS1530: Part 1.
Surface spread of flame		Class 1 to BS476: Part 7 and 0,0,0,0 to AS1530: Part 3.
Building regulations classification		Class 0
Nominal density at EMC* (average)	kg/m³	1000
Alkalinity (approximately)	pH	9
Thermal conductivity (approximately) at 40°C (ASTM C518: 1991)	W/m°K	0.136
Coefficient of expansion	m/mk	-7.5 x 10^{-6}
Nominal moisture content at EMC*	%	8
Thickness tolerance of standard boards	mm	- 0.5 + 1
Length x width tolerance of standard boards	mm	± 5
Surface condition		Front face: smooth Back face: dimple pattern

Thickness (mm)	Standard dimensions (mm x mm)	Number of boards per pallet	Surface per pallet (m²/pallet)	Weight per m² of sheet, dry (approximately) (kg/m²)	Weight per m² of sheet at 20°C, 65% RH (approximately) (kg/m²)	Weight per pallet (approximately) (kg)
6	2440 x 1220	90	267	6	6.48	1730
9	2440 x 1220	61	181	9	9.72	1760
12	2440 x 1220	46	137	12	12.96	1775
15	2440 x 1220	36	107	15	16.2	1733

*EMC: Equilibrium moisture content. The properties in above tables are mean values given for information and guidance only. If certain properties are critical for a particular application, it is advisable to consult your nearest Promat Technical Department.

PROMINA® 60 is manufactured under a quality management system certified in accordance with ISO9001: 2000 Certification and in accordance with the environmental standards of ISO14001. For further technical information, please consult Promat.

GENERAL NOTE: AS WITH MOST BUILDING PRODUCTS, THIS PRODUCT CONTAINS QUARTZ. MECHANICAL MACHINING (CUTTING, SANDING, DRILLING) OF BUILDING PRODUCTS WILL RELEASE DUST WHICH MAY CONTAIN QUARTZ PARTICLES. HOWEVER, FOR THIS PRODUCT, WITH EXPOSURE ASSESSMENTS PERFORMED BY ACCREDITED EUROPEAN LABORATORIES USING REFERENCE WORKPLACE MONITORING METHODS, ANY QUARTZ LEVELS IN THE RESPIRABLE DUST WERE BELOW THE DETECTION LIMITS. INHALATION OF HIGH CONCENTRATIONS OF DUST MAY IRRITATE THE AIRWAYS. DUST MAY ALSO CAUSE IRRITATION OF THE EYES AND/OR SKIN. INHALATION OF RESPIRABLE DUST CONTAINING QUARTZ, IN HIGH CONCENTRATIONS OR OVER PROLONGED PERIODS OF TIME CAN LEAD TO LUNG DISEASE (SILICOSIS) AND AN INCREASED RISK OF LUNG CANCER. AVOID THE INHALATION OF DUST BY USING MACHINERY WITH DUST EXTRACTION. GUARANTEE ADEQUATE VENTILATION ON THE WORK FLOOR. AVOID CONTACT WITH THE EYES AND SKIN AND AVOID INHALATION OF DUST BY WEARING APPROPRIATE PERSONAL PROTECTION GEAR (SAFETY GOGGLES, PROTECTIVE CLOTHING AND DUST MASK). FOR MORE INFORMATION PLEASE CHECK THE SAFETY DATA SHEET, AVAILABLE UPON REQUEST.

Introduction

Electrical and mechanical (E&M) services require fire protection for the following reasons:

- To maintain function of certain essential electrical and/or mechanical systems and services,
- To prevent fire, smoke and toxic fume propagation from one building compartment to another.

It is necessary to ensure the continued function of essential electrical systems and services is maintained during fire, for a specified period of time, until all the building occupants have escaped. Electrical systems that need protection from fire may include:

- Electrical operated fire alarms,
- Emergency escape route lighting,
- Electrical operated extinguishing systems,
- Smoke extraction vent systems,
- Power supply for fire service elevators in high-rise buildings,
- Water mains to sprinkler systems,
- Essential life support and/or computer/communication/information technology networks.

It is worth noting that most electrical services and to some extent mechanical services have a high component of plastic materials such as polyvinylchloride, polypropylene, polyethylene, synthetic rubbers etc. The risks associated with these combustible plastics are that fire can and will spread or propagate through the services. Intensive combustion also means that plastics frequently release toxic and corrosive fumes that can include particulates, unburned fuel, carbon dioxide and carbon monoxide which are not only harmful to the building and its contents but also to its occupants. Such fires can also cause the following problems:

- Production of corrosive and/or toxic gases,
- Long-time destruction of construction and related equipment,
- Smoke development and toxic gases in corridors and escape routes,
- Difficult evacuation,
- Impede fire rescue activities by fire fighters.

Reliability Of Fire Resistant Cables

Typical uses of cables to, in and from Electrical and Mechanical enclosures 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 BS5839: Part 1 and Codes of Practice for Emergency Lighting in BS5266: Part 1.

Most fire resistant cables have been subjected to tests in accordance with BS6387: 1994 “Specification for performance requirements for cables required to maintain circuit integrity under fire conditions” and/or IEC60331-11, 21, 23 & 25 “Test for electric cables under fire conditions – circuit integrity”.

IEC60331 fire test

Unfortunately, these standards only test single cables, without any support system exposed to a small gas flame by means of an elongated Bunsen burner. The heat applied during the test is somehow localised to a small area. While such a test may be adequate for small cables carefully secured directly to a fire resisting wall or floor, it is arguably not suitable to assess the fire performance of larger cables or bunches of cables, exposed to a fully developed fire on all sides, particularly if they are supported on a suspended cable tray which may be passing through compartment walls or floors.

Although the cables may achieve the highest classification of the standard, they may not survive as expected if they are exposed on all sides to a fully developed fire, for example, as the one employed in the ISO834 time-temperature fire curve.

Fire Resistance Test Standards For Cable Protection Systems

The German standards DIN4102, “Fire behaviour of building materials and building components”, Parts 11 and 12 specify fire resistance test for cable protection systems that simulate a real fire scenario.

DIN4102: Part 11 assesses the encasement system when exposed to a fully developed internal fire. The integrity of the encasement, and any penetrations through walls and floors, is measured, as well as the temperature on the outer surface of the duct (140°C mean rise, 180°C maximum rise). The heating curve for DIN4102: Part 11 is the same as that used in BS476: Part 20 and AS1530: Part 4 and the failure criteria for integrity and insulation are almost identical. The systems detailed therein have been successfully tested and assessed and are approved for use to provide a performance in accordance with BS476: Part 20 and AS1530: Part 4 in terms of compartmentation.

DIN 4102 Part 12 assesses the encasement system when exposed to a fully developed external fire. In addition to the requirement to maintain the integrity of the encasement and any penetrations through walls or floors, the standard requires that:

(a) The cables continue to function for the duration of the exposure period,

(b) The temperature on the cable jacket should not exceed 150°C.

The tested encasement system protects a wide range of different cable types. Power is passed through the cables throughout the test.

The Australian/New Zealand standard AS/NZS 3013 “Electrical installations – Classification of the fire and mechanical performance of wiring systems” describes the level of protection of a wiring systems against fire and/or accidental mechanical damage. The tests methods described within this standard calls for wiring systems to maintain circuit integrity when subjected to fire test, mechanical damage tests, and fire and water tests. The resistance to fire test is to determine the ability of a wiring system to maintain circuit integrity under fire conditions for a specified period of time of up to 120 minutes. The wiring system shall be tested in a horizontal furnace complying with AS1530: Part 4, which also employs the ISO834 heating conditions.

Mechanical damage tests are to determine the degree of mechanical impact and cutting load to which the wiring system can be subjected without losing its circuit integrity. The tests are carried out separately from the fire test.

Fire and water test is to assess the ability of a wiring system in maintaining its circuit integrity when subjected to fire conditions followed by hosing with water.

General Design Considerations

In the event of fire performance to internal and external fire, it has been established that an enclosure fabricated from fire resistant boards is one of the best solutions. Such systems have been tested successfully with ducts constructed from fire protective boards such as PROMINA® 60. These well-established board systems are the only systems which currently fulfil all performance requirements, especially to the DIN4102 standards.

A suitably designed duct will:

- 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 area,
- Contain smoke and toxic fumes from burning cables.

Following are some of the factors to consider when determining the correct specification to ensure the enclosure system provides the required fire performance. Further advice can be obtained from the Promat Technical Department.

1. Required Fire Exposure

The specification of the enclosure system will depend on whether it is expected to resist external fire or internal fire or both.

2. Required Fire Performance

Generally, 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 wall and floor penetrations. On occasions further relaxations may be approved, e.g. a reduced insulation performance can sometimes be acceptable if no combustible materials or personnel are likely to be in contact with the duct.

3. Supporting Structure

The supporting hangers and their fixings should be capable of bearing the load of the complete enclosure system including any applied insulation material or other services suspended from it. Chemical anchors are generally not suitable. It is usually not advisable to employ unprotected hangers if the stress exceeds 6N/mm^2 for up to 240 minutes fire exposure and 10N/mm^2 for up to 120 minutes fire exposure and/or if the hanger lengths exceed 2m. The hanger centres should not exceed the distance limits given for the relevant Promat system.

4. Penetrations Through Walls & 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.

5. Ventilation Openings

Heat is generated as current flows through cable core conductors. The greater the electrical flow, the hotter the conductor will get. Excessive current flow will cause overheating and may result in overload, short circuit or ground fault. The material of the cable sheath, usually made from material such as PVC, polyurethane or polyethylene, usually has a self-ignition temperature between 340°C to 490°C.

In general, the heat generated by cables is negligible. However, a ventilation opening at appropriate intervals is recommended along a cable duct to prevent the build up of excessive heat. Ventilation openings must have a self-enclosing capability in the event of fire so as to prevent fire spread via such openings.

6. Access Hatches

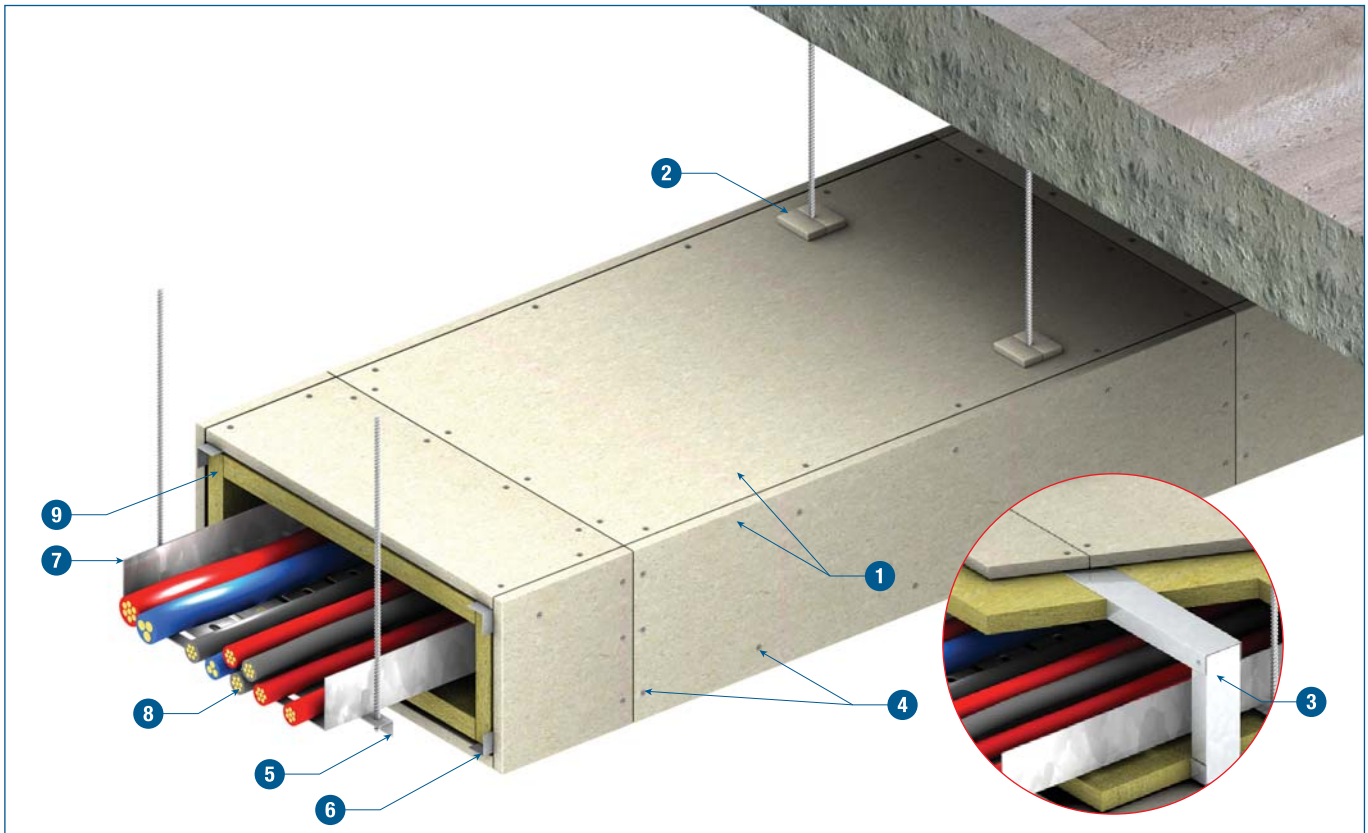
For future inspection and installation of cables, a loose lid construction, can be considered. Alternatively, the lid can be fixed and the inspection openings with hatches can be provided in the side walls of the duct. The hatch is secured completely to the duct using threaded inserts such as “Tecserts” (Armstrong Fastening Systems) at maximum 200mm centres.

7. Other Requirements

Acoustic performance, thermal insulation, water tolerance, strength and appearance can also be important considerations (see BS8313: 1997 Code of practice for accommodation of building services in ducts).

Fibre Optics

Fibre optic cables have a lower failure temperature due to the fact that the conductor is made of bundles of optical fibres that are as thin as a human hair. Fibre optic cables are widely used for IT networking in many industries, especially in financial and healthcare services. For example, large banks depend on their network cabling systems for most of their routine business transactions. If fire occurs and even one metre of cabling is destroyed, it could cost the company hundreds of millions of dollars each day their systems remain inoperative. These are problems that businessmen do not want to face and one reason why it is necessary to protect sensitive, strategically important cables against fire risk. The Promat Technical Department should be consulted to determine the required board thickness and construction details.



TECHNICAL DATA

1. For FRL of 60/60/60
   1 layer of PROMINA® 60 board 9mm thick
2. 1 layer of PROMINA® 60 cover board 75mm x 75mm x 9mm thick or sealing with PROMASEAL® AN Acrylic Sealant where hangers penetrate the enclosure
3. Steel channel collar 50mm x 30mm x 0.6mm thick at nominal 1220mm centres to coincide with joints between boards. See more details on page 7.
4. No.8 self-tapping drywall type screws at nominal 200mm centres, 25mm long to frame and 20mm long to cover fillets.
5. Threaded rod hanger with stress not to exceed 15N/mm²
6. Steel angle, minimum 50mm x 50mm x 0.5mm thick for 1, 2, 3 or 4-sided construction at corner joints.
7. Steel cable tray
8. General E&M services, e.g. cable trunking, steel pipes etc.
9. Mineral wool 50mm x 100kg/m³

Where the enclosure passes through a fire compartment wall, the penetration must be properly sealed. 1 layer of L-shaped PROMINA® 60 collar, sized 100mm x 9mm thick, is required to be fitted around the enclosure on both sides on the wall. For enclosure more than 1500mm wide, collar size 150mm x 9mm thick is required. See details on page 8.

The provision of fire resisting construction to general building services in accordance with the performance criteria of BS476: Part 20.

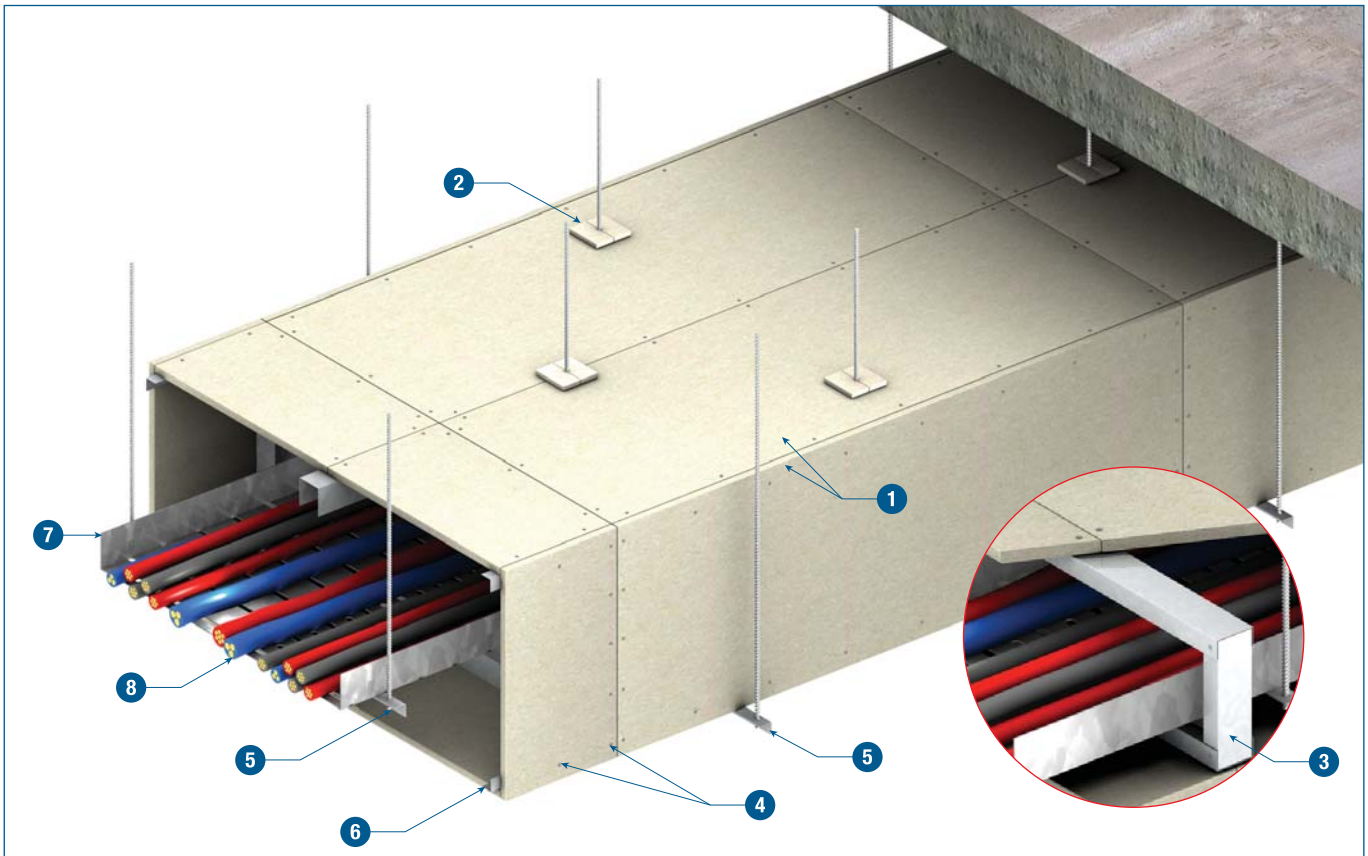
General building services include mechanical and electrical services typically used in normal buildings; such as small steel ducts, metal and plastic pipes, electrical and telecommunications cables. As no specific British Standard exists for such application, Promat constructions have been tested in accordance with the criteria of German DIN or British Standard BS476: Part 24, and appraised to BS476: Part 20.

The appraisals include allowance for both internal and external fire. The integrity and where pertinent the insulation performance of the enclosure, and any penetrations through the compartment walls and floors, is measured.

Circuit integrity of electrical cables, or ability of the services to function are not measured and do not constitute part of the failure criteria. For the provision of a protection system that ensures other services remain functional in the event of fire, e.g. fuel pipes, please consult the Promat Technical Department.

System Specification

General E&M services enclosures are to be constructed using PROMINA® 60 matrix engineered mineral boards all in accordance with the Architectural Specification in the manufacturer's handbook. Relevant constructions are to be selected according to the required FRL of 60 minutes of the selected elements. All printed installation details are to be followed to ensure approval to BS476: Part 20. All work to be certified by installer in an approved manner.



TECHNICAL DATA

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   1 layer of PROMINA® 60 board 9mm thick
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3. Steel channel collar 50mm x 30mm x 0.6mm thick at nominal 1220mm centres. All board joints to coincide with a framing member. See more details on page 7.
4. No.8 25mm long self-tapping drywall type screws at nominal 200mm centres
5. Services steel hanger at nominal 1220mm centres with stress not to exceed 15N/mm²
6. Steel angle minimum 50mm x 50mm x 0.5mm thick at corner joints
7. Steel cable tray
8. General E&M services, e.g. cable trunking, steel pipes etc.

Where the enclosure passes through a fire compartment wall, the penetration must be properly sealed. 1 layer of L-shaped PROMINA® 60 collar, sized 100mm x 9mm thick, is required to be fitted around the enclosure on both sides on the wall. For enclosure more than 1500mm wide, collar size 150mm x 9mm thick is required. See details on page 8.

PROMINA® 60 enclosures provide protection against fire to general building services in accordance with the relevant criteria of BS476: Part 20, for both internal and external fire.

The PROMINA® 60 system featured above ensures integrity of fire compartments.

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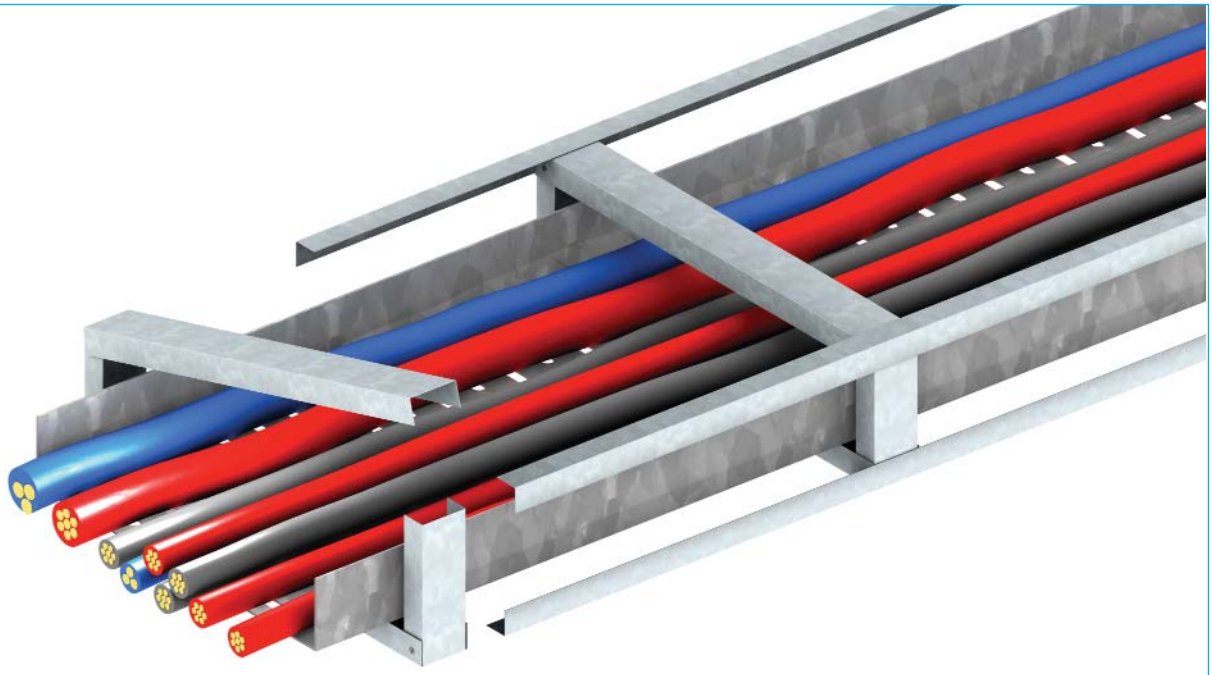


Steel channel framed enclosure

Internal Steel Framework

The corner junctions of the enclosure are reinforced with internal steel angles, minimum size according to system specification. These corner angles are not necessary if boards of thickness 20mm and above are used, as the boards can be screwed to each other using deep thread drywall type screws or steel wire staples.

External steel angle

Internal steel angle

Four-sided steel channel collars are positioned at approximately 1220mm centres to support the boards. The steel channels are of minimum size 50mm x 50mm x 0.9mm thick or 50mm x 25mm x 0.5mm depending on the system specification. See **Steel channel framed enclosure** above.

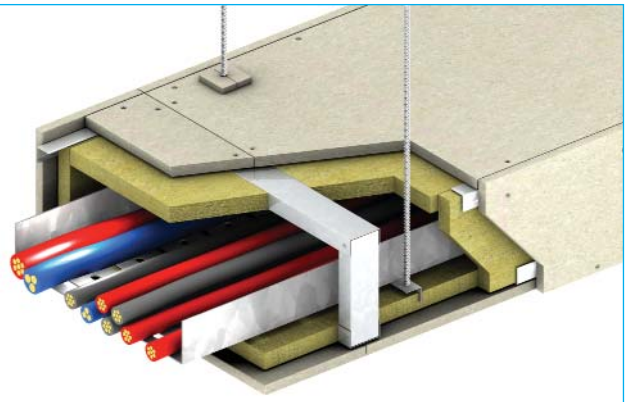
Fixing of Boards & Mineral Wool

The type of board and thickness shall be selected according to the system specification and the required fire resistance level. The boards are fastened to the channel frames and corner angles with self-tapping screws of appropriate length at 200mm nominal centres.

For systems where corner angles are not used, i.e. for 20mm or thicker boards, the boards are to be fastened at the corners with 25mm x No.6 steel self-tapping screws at 200mm nominal centres.

Longitudinal joints in the boards (other than the corner joints) must be back by a steel channel.

The cavity between the boards and the building services is filled with mineral wool with thickness and density corresponding to the system's requirement. The steel channels are also filled with the same mineral wool. See details in **Collar section**.



Collar section

Building Services & Enclosure Support

The hangers used to support the building services enclosure must have tensile and bending stresses not exceeding 15N/mm^2, 10N/mm^2 and 6N/mm^2 for fire ratings of up to 60, 120 and 240 minutes respectively. If these stress levels are exceeded then the size of the hanger members must be increased or, alternatively, the spacing of the hangers reduced.

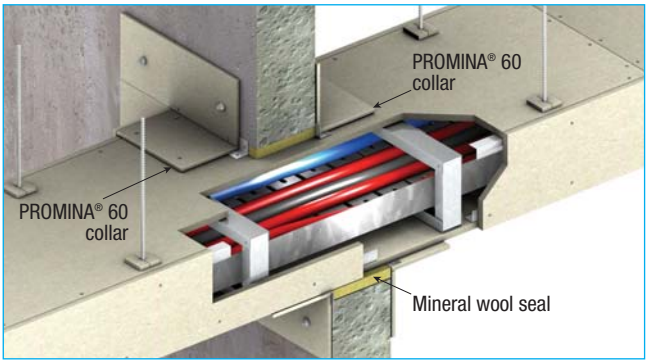
The fixings used to fasten the threaded hanger rods to concrete soffits must be all-steel expanding anchors with a penetration into the concrete. The anchors must match the size of the threaded rods, be of sufficient strength to support the weight of the enclosure and be fitted in accordance with the manufacturer's specification. When the hanger rods are suspended from protected structural steel beams, the rods must be protected for at least 300mm from the beams with the same levels of protection as the structural beams.

Where the hangers exceed 2000mm in length, the hangers should be clad with a material of similar thickness to the enclosure to prevent excessive thermal expansion. Where the hanger rods emerge from the PROMINA® 60 enclosure, the hole/slot must be sealed with PROMASEAL® AN Acrylic Sealant and a cover plate.

If the building service being encased is a plastic pipe, external hangers and angles will be required to independently support the enclosure.

Wall Penetrations

Where the enclosure passes through a fire compartment wall, the penetration must be properly sealed. The space between the enclosure and the reveal of the opening in the wall is filled with mineral wool of minimum 110kg/m³ density. One layer of L-shaped PROMINA® 60 collar is required to be fitted around the enclosure on both sides of the wall.

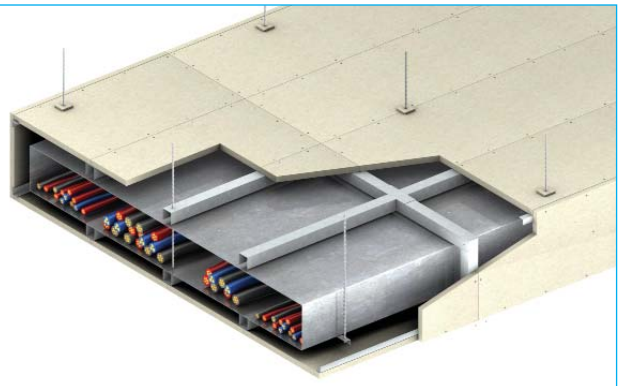


Internal Cross Section Dimension
(more than 1500mm x 1500mm)

The maximum approved internal dimensions of the enclosure is 6000mm wide x 2500mm high. For enclosures with internal dimensions greater than 1500mm x 1500mm, additional threaded rods are fitted at each hanger position, at 1500mm maximum centres across the width of the enclosure. These threaded rods pass through the enclosure and support the horizontal hanger support element beneath the enclosure. The rods also support the top of the enclosure using a nut and large steel washer, this prevents bowing under fire conditions of wide enclosure systems.

As the width of the enclosure system increases, the spacing of the channel collars must be reduced so that the maximum area of unsupported board does not exceed 1.5m².

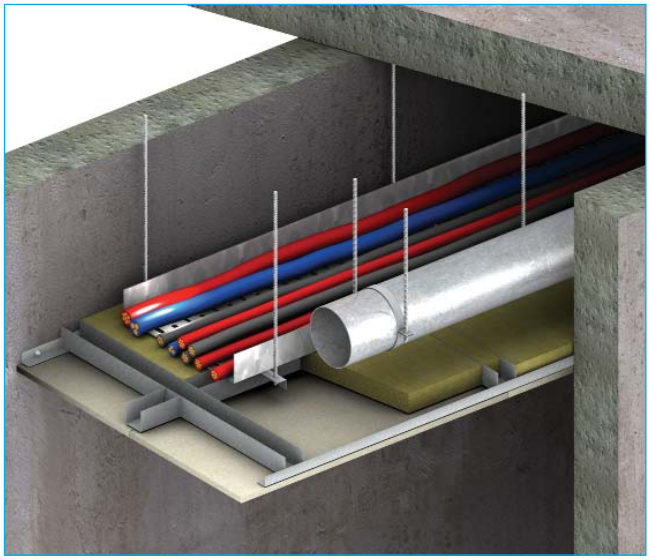
The penetrations of the rods through the enclosure are sealed with PROMASEAL® AN Acrylic Sealant.

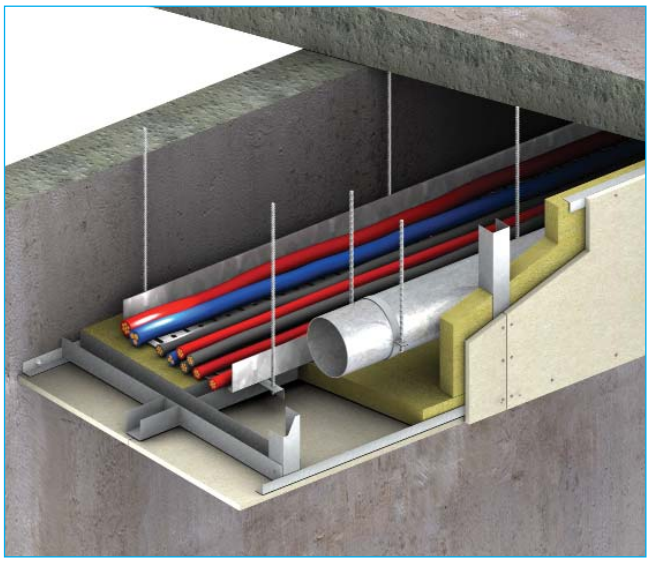


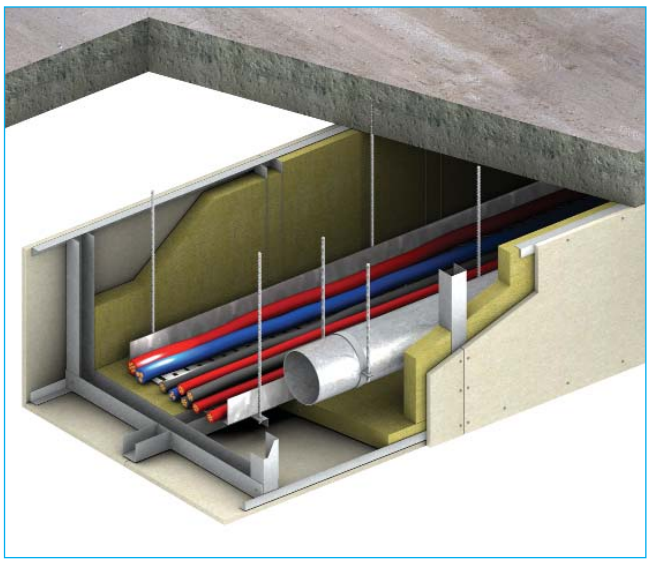
Example of enclosure up to 6000mm wide x 2500mm high
Please note, the requirements for additional hanger support within the duct for greater width, e.g. 6000mm duct will require two central supports at 2000mm centres.

1, 2 & 3-sided Enclosures

3-sided, 2-sided and 1-sided enclosures are constructed in the same way as 4-sided enclosures. Steel angles of 50mm x 50mm x 0.9mm thick for up to 60 minutes fire protection respectively, are fastened to the floor soffit or wall with M8 all-steel expanding anchors at 500mm nominal centres. The PROMINA® 60 boards forming the walls of the protection to the building services are then fastened to the angles with steel self-tapping drywall type screws in appropriate length at 200mm nominal centres. The services are independently supported.



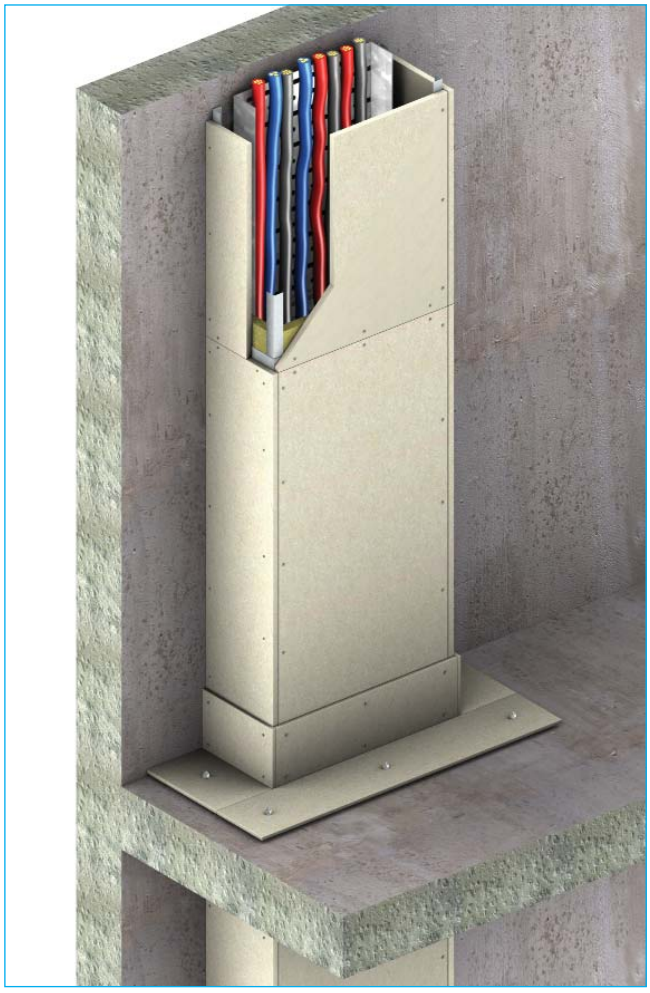




From top: **3-sided, 2-sided and 1-sided E&M services enclosures using PROMINA® 60 boards.**

Vertical Enclosures

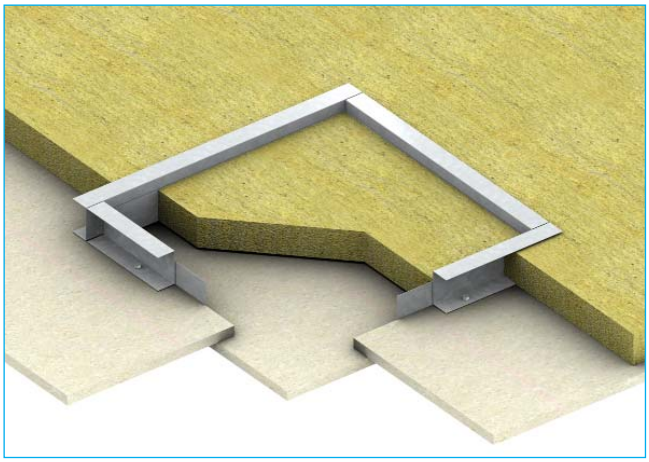
The construction of vertical enclosures is the same as for the horizontal enclosures. Where a vertical enclosure is located adjacent to a wall, the enclosure should be restrained at the wall with threaded rods and support sections.

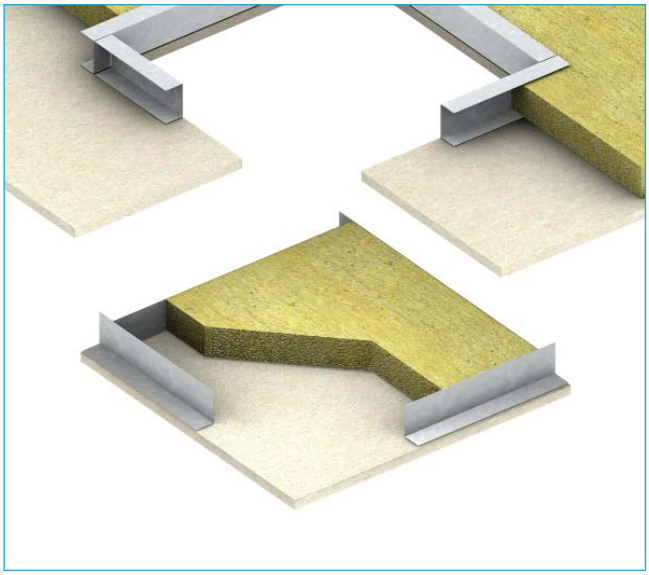


The weight of the PROMINA® 60 enclosure assembly must be taken at each floor level. Steel angles may be fitted to the enclosure at floor penetration level and sits upon the floor slab, supporting the weight of the PROMINA® 60 enclosure.

Access Panels

The maximum allowable dimension of the access panels is 600mm x 600mm. The panels are fixed to the enclosure through steel channels using steel bolts and nuts at nominal 200mm centres. The thickness of the boards and the mineral wool specifications should be according to the system's requirement. The mineral wool can be encapsulated within the C-channel sections which in turn are fixed to the access panel by means of steel self-tapping screws.

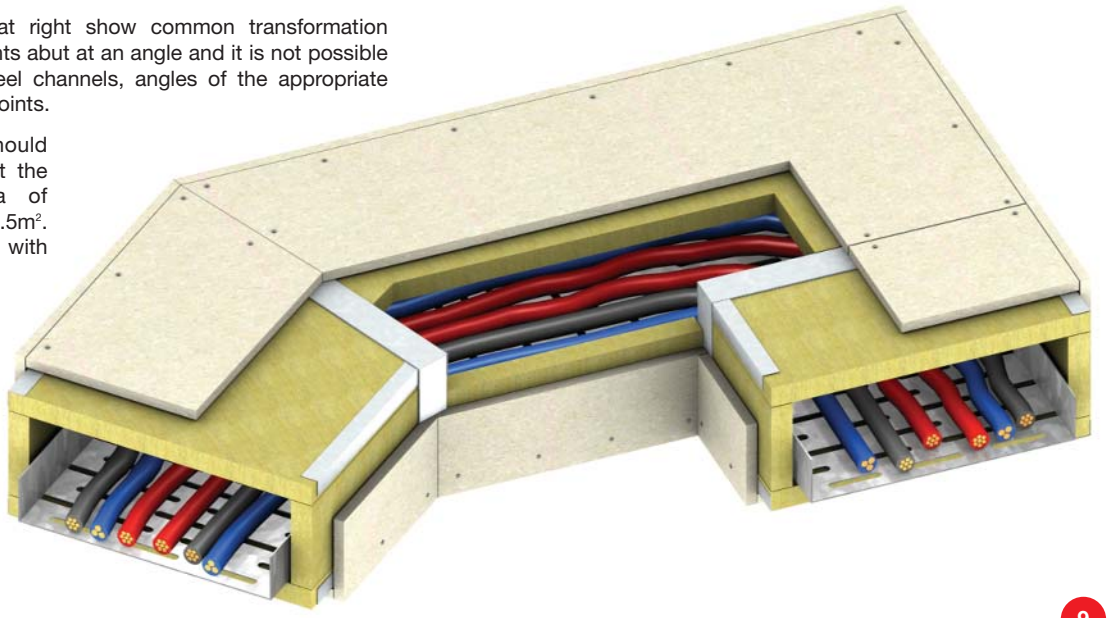




Transformation Sections

The figures below and at right show common transformation sections. Where board joints abut at an angle and it is not possible to back the joint with steel channels, angles of the appropriate degree are used at these joints.

The steel channels should always be placed to limit the total unsupported area of board to a maximum of 1.5m^2. Bends must be supported with hangers at mid-span.



Architectural Specification

Following is the standard Architectural Specification for general building services enclosure system constructed using PROMINA® 60. The designer must determine the suitability of the design to the application and requirements before undertaking or constructing any works relating to the specifications and where in doubt should obtain the advice of a suitably qualified engineer.

External & Internal Fire

60 minutes integrity and _____ minutes insulation in accordance with the criteria of **BS476: Part 20: 1987**.

Supporting Structure

Care should be taken that any structural element by which the enclosure system is supported, e.g. a beam, floor or wall, has at least equivalent fire resistance.

Lining Boards

Single-layer 6mm thick PROMINA® 60 matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Internal and external cover strips made of 100mm wide and a minimum of 9mm thick PROMINA® 60 boards, where applicable, are secured to the enclosure over the board joints.

Type of Fixing

Galvanised steel frame made of channel sections 50mm x 50mm x 0.9mm thick or 50mm x 25mm x 0.5mm thick depending on the system specification, at 1220mm centres or at every butt joint of boards, with corner angles 30mm x 30mm with thickness of 0.5mm or 0.7mm, depending on the system specification, are fixed to the channel collars at the corners. The services will be suspended with hanger rods with hanger diameter sized to limit stress, 15N/mm^2.

PROMINA® 60 boards will be screw-fixed to the frame with _____mm[1] self-tapping screws at 200mm centres. Where applicable, butt joints should be covered with 100mm wide x 9mm thick PROMINA® 60 cover strips. Mineral wool in accordance with the system specification will be tightly filled around the existing services, i.e. between the gap of boards and the services.

Tests & Standards

The complete system along with material and framing is tested and/or assessed to meet the requirements of BS476: Part 20.

Jointing

Plain butt joints between machined edges of boards. [2]
Joints filled in preparation for painting. [3]
Joints filled and taped in preparation for decoration. [4]

Follow-on Trades

Surface of boards to be prepared for painting/plastering/tiling[5] in accordance with manufacturer's recommendations.

NOTES:

- [1] insert screw length as appropriate taken from which system detailed on pages 5 and 6.
- [2], [3], [4], [5] delete as appropriate.
- Perimeter gaps will be filled with fire resistant PROMASEAL® AN Acrylic Sealant.

Promat General Terms & Conditions of Sale

1. BASIS OF SUPPLY

(a) These Conditions of supply of goods and services of Promat International (Asia Pacific) Ltd (Promat) govern all orders to and contracts with Promat for the supply of goods and services and override any other terms or conditions stipulated, incorporated or referred to by the Customer. Accordingly these Conditions of supply of goods and services, except where they are varied by Promat in writing, are the conditions upon which Promat supplies goods or services.

(b) No alteration or modification of these Conditions shall have effect unless such alteration or modification is accepted in writing by a duly authorised officer of Promat.

2. DRAWINGS, QUANTITIES & INTELLECTUAL PROPERTY

(a) Any drawings or details of quantities or other information supplied by Promat must be treated as approximate and shall be subject to verification by the Customer and in the event of any alteration, modification or amendment thereto after quotation, Promat reserves the right to alter, modify or amend its quotation accordingly.

(b) All intellectual property rights (including without limitation patents, copyrights, rights in a design and trade marks) in the goods or services are the property of Promat and nothing in these Conditions shall be construed as constituting an assignment or license thereof.

(c) If the goods are manufactured by Promat, or Promat applies a process, in accordance with a specification of the Customer then the Customer shall indemnify Promat against all loss, damage, cost and expense awarded against or incurred by Promat in connection with the infringement of any intellectual property rights of any other person resulting from Promat's use of the Customer's specification.

(d) Promat's employees or agents are not authorised to make any representations, or give any advice or recommendations, concerning the goods or services unless confirmed by Promat in writing. In entering into the contract the Customer acknowledges that it does not rely on, and waives any claims for breach of, any such representations, advice or recommendations which are not so confirmed.

3. PRICES

(a) All prices are exclusive of duty or tax and Promat reserves the right to increase prices as a result of the increase or imposition of any duty or tax or by adjustments or alterations in currency rates of exchange.

(b) All prices exclude delivery (pursuant to and defined in Condition 4 below) and packaging and packing costs unless otherwise stated.

4. DELIVERY

(a) All delivery dates or periods given by Promat whether before or after acceptance of the order are given in good faith but Promat shall be under no liability whatsoever for any failure or delay in despatch, supply or delivery nor for any loss or damage arising in connection therewith.

(b) Should despatch or delivery of the goods, or the supply of services, or part of them be delayed or prevented from any cause whatsoever beyond Promat's control or for a reason attributable to the Customer or its customers or agents then, in Promat's opinion, either the contract or any unfulfilled part thereof shall be terminated or Promat may extend the time for delivery until a reasonable period after such cause shall have ceased in which event the Customer shall be responsible for all storage and other costs incurred by Promat in connection therewith (including, without limitation, delivery and redelivery costs). Any termination shall not prejudice the rights and obligations of either party in respect of any part of the contract already completed but Promat shall have the right to sell undelivered goods and charge the Customer for any shortfall below the price under the contract.

(c) Unless otherwise agreed delivery shall take place at the godown or factory of Promat or at a site nominated by Promat. The Customer shall be responsible for providing labour and facilities at the delivery point for the unloading of goods ordered by him and shall indemnify Promat against all claims whatever arising from such unloading operations. In the event Promat and the Customer agreed delivery to take place at a site nominated by the Customer, Promat reserves the right for its drivers and carriers to refuse to take their vehicles on such site if in the opinion of the driver or carrier the site conditions are such as to constitute a danger to the vehicles, the goods or to any persons or property in which event the provisions of Condition 4(b) apply.

(d) Where the goods are to be delivered in instalments (but strictly without prejudice to Condition 6) each delivery shall constitute a separate contract and failure by Promat to deliver any or more of the instalments in accordance with these Conditions, or any claim by the Customer in respect of any one or more of the instalments, shall not entitle the Customer to treat the contract as a whole as repudiated.

5. PROPERTY & RISK

(a) The risk in the goods shall pass to the Customer when Promat delivers the goods in accordance with these Conditions whether to the Customer or to any other person to whom Promat has been authorised by the Customer to deliver the goods.

(b) Notwithstanding delivery and passing of risk the goods supplied hereunder shall remain the property of Promat until Promat has received payment in full in cash or cleared funds of all sums, which are or may hereafter become due from the Customer to Promat in respect of the goods or in respect of any other contract between the parties.

(c) Until the property in the goods passes to the Customer the relationship between Promat and the Customer shall be that of bailor and bailee.

(d) The Customer agrees to store the goods until they have been paid for in such a way that they are readily identifiable as the property of Promat.

(e) The Customer shall nevertheless have authority until such time as property in the goods passes to the Customer to sell the goods to its customers, but in the event of the Customer selling the goods or otherwise disposing of them it is hereby agreed that any such sub-sale or disposal shall be deemed to be made on behalf of Promat (but without imposing any liability on Promat to the Customer's customer), and the Customer shall hold the proceeds of sale or rights arising there from against the Customer's customer on behalf of Promat until such time as the Customer shall have made full payment for such goods and immediately upon such sale or disposal the property rights of Promat shall pass to the Customer on condition that the Customer ensures that the Customer's customer pays the purchase price into a separate bank account in the name of the Customer.

(f) The Customer is hereby also authorised to use the goods in any manufacturing or other process in the normal course of its business before payment in full has been made as referred to in Condition 5(b) but upon so doing the Customer shall set aside the price of the goods so used in a separate account as referred to in Condition 5(e).

(g) Until such time as property in the goods passes to the Customer then Promat may recover and/or resell the goods or any of them and may enter upon the Customer's premises by its servants or agents for that purpose and the Customer hereby grants to Promat an irrevocable license to this effect which shall survive the termination of the contract for any reason.

(h) Nothing in this Condition 5 shall confer any right on the Customer to return goods supplied by Promat or to refuse or delay any payment for them.

(i) If the goods or any part thereof are incorporated in or used as material for or in manufacturing other products before payment in full to Promat the property in the whole of such products shall vest in and remain with Promat until such products have been sold and all Promat's rights hereunder in relation to the goods and/or the proceeds of sale thereof shall extend to such products. Promat's rights hereunder shall be in addition to any and all other rights it may have against the Customer at law or in equity.

6. PAYMENT & LIEN

(a) Unless otherwise stated, payment for the goods or services shall be made by the last working day of the month (Monday-Friday) following the month of delivery.

(b) Interest shall be payable by the Customer to Promat or any sum outstanding beyond the due date for payment at the rate of 3% per annum above the Prime Lending Rate quoted by The HongKong and Shanghai Banking Corporation Limited of Hong Kong from time to time.

(c) Where payment is to be made by installments the failure of the Customer to pay any installment in due time shall entitle Promat to treat such failure as repudiation of the whole contract by the Customer and (without prejudice to any other rights) to recover damages for such breach of contract.

(d) Promat shall have a general lien upon any goods of the Customer for the time being in the possession of Promat.

7. CANCELLATION

Once an order has been duly accepted by Promat cancellation by the Customer will only be accepted at the sole discretion of Promat subject to Promat being indemnified in full against all charges, losses (including loss of profit), costs and expenses incurred by Promat as a result of such cancellation.

8. SUSPENSION OR TERMINATION OF CONTRACT

(a) If the Customer shall, in the sole opinion of Promat, be unable or be likely to be unable to pay any sums he owes Promat, Promat shall (without prejudice to any other rights) be entitled to demand security prior to delivery or the carrying out of any services either by payment in cash or by bank guarantee, notwithstanding any terms of payment previously agreed, and in the event that the Customer is unable to provide the security the Customer shall be deemed to have repudiated the contract and Promat shall be entitled to delay delivery of the goods indefinitely or refuse to commence any services or accept the repudiation of the contract without liability whatsoever.

(b) If the Customer commits any breach of these Conditions or of the contract or if any distress or execution be levied upon the Customer or his property or if the Customer shall make or offer to make any arrangement with creditors or commit any act of bankruptcy or if any petition receiving order in bankruptcy be presented or made against him or if a receiver, administrative receiver, administrator or manager be appointed over all or any of the assets of the Customer or if a winding up order be made against the Customer or if the Customer goes into liquidation (otherwise than for the purpose of reconstruction or amalgamation) Promat shall, without prejudice to any other rights and remedies it might have and without any liability, have the right immediately by notice in writing to:-

(i) suspend or terminate any contract or any unfulfilled part thereof; and

(ii) stop delivery of any goods or services; and

(iii) call for immediate payment of all monies owing to Promat under any contract.

9. STORAGE, FIXING, HEALTH & SAFETY

(a) All goods supplied to the Customer hereunder shall be stored and fixed in accordance with the manufacturer's instructions set out in the latest written recommendation of Promat and any relevant British Standard Codes of Practice and Promat shall be under no liability whatsoever for any loss or damage which may arise as a result of the failure to adhere to such recommendations in all respects.

(b) Nothing in these Conditions, nor any compendiums, brochures, price lists, instructions, method statements or other documents or designs issued by or on behalf of Promat shall create or be deemed to create any obligation, whether expressed or implied, on Promat.

10. GUARANTEE & LIABILITY

(a) Save as provided in this Condition 10 and except that this Condition 10 may be rendered void or unenforceable under any enactment, no term or condition is made or to be implied as to the quality (satisfactory or otherwise) or fitness of goods supplied or that they will be suitable for any particular purpose or for use under any specific conditions which may be known or made known to Promat and accordingly there are excluded all conditions or warranties expressed or implied by statue, common law trade usage or otherwise and Promat shall be under no liability to the Customer for any loss, damage or injury or expense arising from a defect in the goods or from any cause whatsoever relating to the goods.

(b) Promat shall not, notwithstanding any other provision of these Conditions, under any circumstances be liable in contract, tort (including negligence or breach of statutory duty), statue or otherwise for any indirect or consequential loss or damage of any kind or for any increased costs or expenses or loss of profit, business, contract, revenues or savings.

(c) The Customer shall inspect all goods immediately upon delivery and in the event that the Customer alleges that the quantity of goods delivered does not correspond with the quantity stated in the delivery note or that such goods are defective he shall within three days of delivery give to Promat notice in writing specifying the particular of his complaint. In the event of failing to give such notice as aforesaid, Promat shall have no liability in respect of any alleged non delivery of goods or defects therein which should have been apparent on a reasonable visual inspection at the time of delivery.

11. FORCE MAJEURE

Promat may cancel any contract without prejudice to any of the rights and remedies it may have and without any liability whatsoever if prevented from performing it, owing to any cause whatsoever beyond Promat's reasonable control.

12. MISCELLANEOUS

(a) Time shall be of the essence of the contract.

(b) Any notice to be given Promat or the Customer shall be sufficiently given if posted by first class letter post or delivered by hand to the other at the address set out in the contract. Every notice shall be deemed to have been received and given either forty-eight hours after posting or at the time of the delivery.

(c) Promat shall be at liberty to enter into sub-contracts with third parties or to assign the contract for the purpose of discharging its obligations under the contract.

(d) No waiver by Promat by any breach of the contract by the Customer shall be considered as a waiver of any subsequent breach of the same or any other provision.

(e) The contract and these Conditions are governed by Hong Kong Law and any dispute arising in relation to the goods supplied or the terms of the contract shall be determined by the Hong Kong Courts to whose jurisdiction and decision Promat and the Customer submit.

NOTE: SPECIFIC TERMS & CONDITIONS SHOULD BE OBTAINED FROM THE RESPECTIVE COUNTRY OFFICES.

Promat

For latest information of the Promat Asia Pacific organisation,
please refer to www.promat-ap.com

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