Promat

M&E Services Enclosure

Passive Fire Protection

M&E Services Enclosure

Technical Manual

Hong Kong version

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Revision 1 / 2025-05

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Introduction

Mechanical and electrical (M&E) services require fire protection to maintain function of certain essential mechanical and/or electrical systems and services for penetration of 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
- Electrically operated extinguishing systems
- Smoke extraction venting systems
- Power supply for fire service elevators in high rise buildings
- Water main supply and pumps servicing sprinkler systems
- Essential life support and/or computer, communication or information technology networks

It is worth noting that most electrical and to some extent mechanical services contain a high component of plastic materials such as polyvinylchloride, polypropylene, polyethylene, synthetic rubbers etc. The risks associated with these combustible plastics are such 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 fi res can also cause the following problems:

- Production of highly corrosive and extremely toxic gases
- Long term destruction of buildings and equipment
- Smoke development and toxic gases in corridors and escape routes
- Difficult evacuation
- Impedance of rescue activities by fire-fighters

Reliability of fire resistant cables

Typical uses of cables to, in and from M&E enclosure 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 fire alarm systems for buildings" (BS 5839: Part 1: 2002 + A2: 2008) and "Codes of practice for emergency lighting of premisses" (BS 5266: Part 1: 2005).

Many fire resistant cables have been subjected to tests in accordance with BS 6387: 1994 "Specification for performance requirements for cables required to maintain circuit integrity under fire conditions" and/or ISO IEC 60331: Parts 11, 21, 23 and 25 "Test for electric cables under fire conditions – circuit integrity". See also ISO IEC 60331: Parts 1, 2 and 3.

Unfortunately, these standards only test single cables or small bunches of 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 localised to a small area. While such a test may be adequate for small cables carefully secured directly to a fire resistant wall or floor, it is arguably not suitable to assess the fire performance or larger cables or bunches of cables, exposed to a fully developed fire on all sides, especially if they are supported on a suspended cable tray which may pass 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 as described, for example, by the ISO 834 time-temperature fire curve.

Fire resistant test standards for cable protection systems

The German standards DIN 4102: Parts 11 and 12, "Fire behaviour of building materials and building components", specify fire resistance test for cable protection systems that simulate a fully developed fire scenario.

DIN 4102: Part 11: 1985 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 encasement (140°C mean temperature rise, 180°C maximum temperature rise). The heating curve for DIN 4102: Part 11: 1985 is the same as that used in BS 476: Part 20: 1987 and the failure criteria for integrity and insulation are identical. The systems detailed herein have been successfully tested and assessed and are approved for use to provide a performance in accordance with BS 476: Part 20 in terms of compartmentation.

DIN 4102: Part 12: 1991 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 the cables continue to function for the duration of the exposure period AND the temperature on the cable jacket should not exceed 150°C.

The tested encasement system protects a wide range of different cable types. Electrical current is passed through the cables throughout the test. As an added safety factor, the system described on 20 will ensure that the temperature on the cable jacket does not exceed 120°C.

DIN 4102: Part 12: 1991 is designed to test the functionality of cables under fully exposed fire conditions, unlike the IEC 60331 test regimes. The systems detailed herein relate to maintaining compartmentation as well as the full function of the cables. For more information related to such systems, please consult Promat.

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Design considerations

In the event of an internal or external fire performance, 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 encasement constructed from PROMATECT®-H, PROMINA® 60, and PROMATECT®-S boards. These are representative of the few systems which fulfil all performance requirements, especially to the DIN 4102 standards. A suitably designed duct will perform the following:

- → Prevent the propagation of fire from one building compartment to another.
- → Assist in maintaining smoke free escape routes.
- → Ensure the continuing operation of other services within a common service shaft.
- → Reduce damage to a localised area.
- → Contain smoke and toxic fumes from burning cables.
- → Ensure cable maintain their function when exposed and where required.

The following are some of the factors to consider when determining the correct specification to ensure the enclosure system provides the required fire performance.

Required fire exposure

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

Required fire performance

Generally, the most onerous requirement is to maintain the functional 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 enclosure system and/or wall and floor penetrations. On some 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 enclosure.

Supporting structure

The supporting hangers and their fixings should be capable of bearing the load of the complete enclosure system including any applied insulation materials or other services suspended from it. Chemical anchor bolts are generally not suitable. It is usually not advisable to employ unprotected hangers if the stress exceeds 6N/mm² for up to 240 minutes fire exposure and 10N/mm² for up to 120 minutes fire exposure and/or if the hanger lengths exceed 2m. Hanger centres should not exceed the distance 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 penetration seals.

Ventilation openings

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

In general, the heat generated by cables is negligible if appropriately vented. Ventilation openings must have a self-enclosing capability in the event of fire so as to prevent fire spread via such openings. It is recommended that an electrical engineer is consulted to ensure heat build-up does not become an issue. Should ventilation be required, please refer to Promat Ventbox and PROMASEAL® Ventilation Grille.

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 enclosure. The hatch is secured completely to the enclosure using threaded inserts such as “Tecserts” (Armstrong Fastening Systems) at maximum 200mm centres.

Fibre optics

Fibre optic cables have a lower failure temperature (typically 50–80°C) due to the fact that the conductor consists bundles of glass fibres which can be 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 1m of the cabling is destroyed, it could cost the company millions of dollars each day their systems remain inoperative. It is therefore necessary to protect sensitive, strategically important cables against fire risk.

Selection of board type

Systems constructed from PROMATECT®-H, PROMINA® 60, and PROMATECT®-S boards are generally suitable for most applications in building construction. The boards are lightweight, water tolerant and resistant to impact and abrasion, particularly PROMATECT®-H. For higher performance requirements, e.g. resistance to hydrocarbon fires in tunnel environments, please consult Promat.

Other requirements

Acoustic performance, thermal insulation, water tolerance, strength and appearance can also be important considerations. Please refer to BS 8313: 1997 “Code of practice for accommodation of building services in ducts”.

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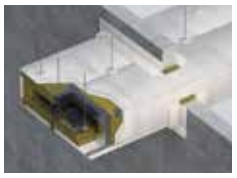
PROMATECT®-H M&E services enclosure (Integrity & insulation)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/60/60	PH.50.60-CS	9mm	50mm x 60kg/m³	RED R23J17-1A issue 1	7
	-/120/120	PH.50.12-CS				
	-/120/120	PH.50.12-CS	12mm	50mm x 100kg/m³	RED R24B21-1A	
	-/240/240	PH.50.24-CS	2 x 9mm	2 x 50mm x 100kg/m³	RED R22C10-1A issue 1	8

PROMINA® 60 M&E services enclosure (Integrity & insulation)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/60/60	PMF.50.60	9mm	50mm x 60kg/m³	RED R23D34-1A	9

PROMATECT®-H M&E services enclosure (Integrity only)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/60/-	PS.50.60E	9mm	Not required	RED R22J25-1A	10
	-/120/-	PS.50.12E				
	-/240/-	PS.50.24E	12mm			

PROMINA® 60 M&E services enclosure (Integrity only)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/120/-	PMF.50.12E	9mm	Not required	RED R23D33-1A	11

PROMATECT®-S M&E services enclosure (Integrity & insulation)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/120/120	PS.50.12	6mm	80mm x 140kg/m³	RED R23D19-1A	15
	-/240/240	PS.50.24	9.5mm	120mm x 140kg/m³		

PROMATECT®-S M&E services enclosure (Integrity only)

	FRR	Model number	Board thickness	Mineral wool thickness x density	Test assessment report no. (BS 476: Part 20: 1987)	Page no.
	-/120/-	PS.50.12E	6mm	Not required	BRE CC 277369 Review 2 Issue 1	16
	-/240/-	PS.50.24E	9.5mm			

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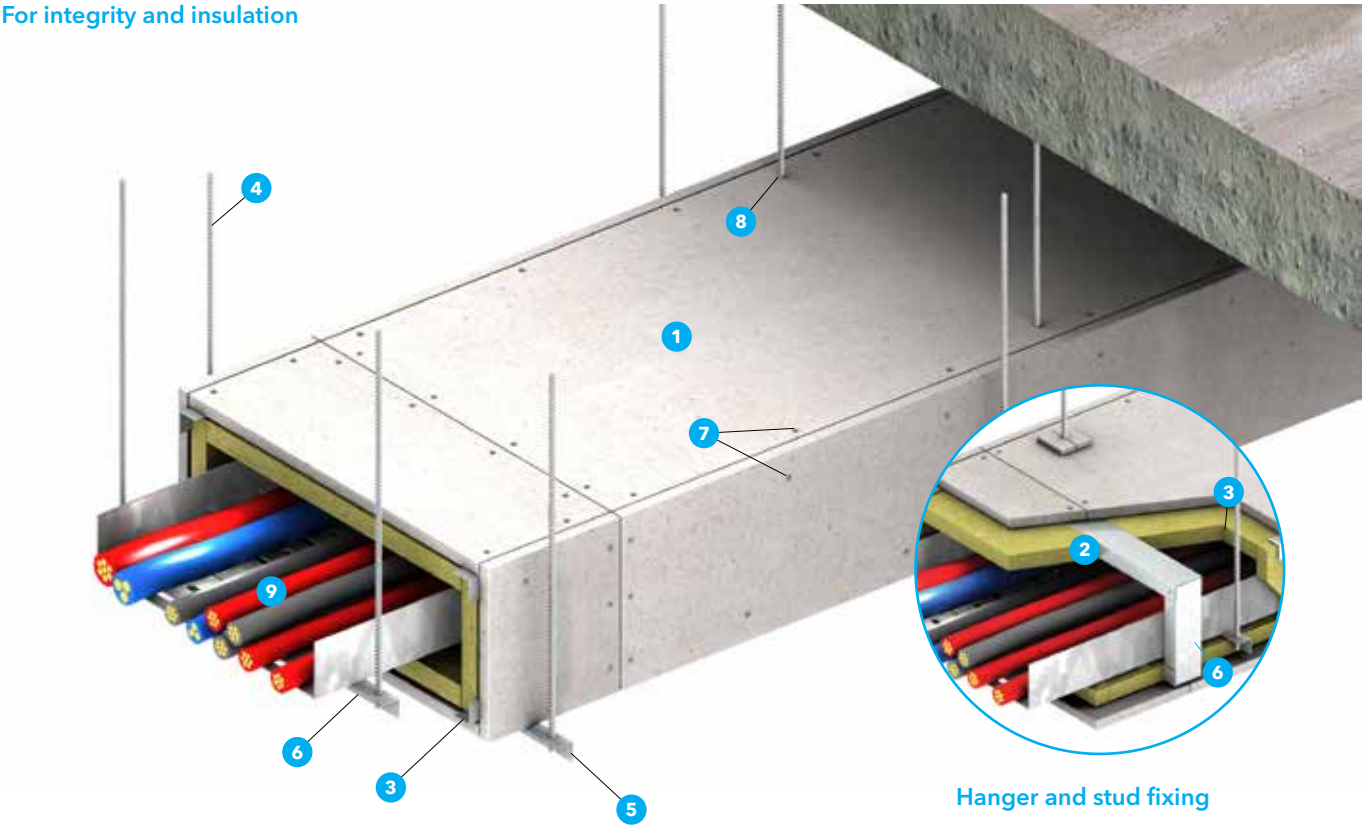
PROMATECT®-H M&E services enclosure (Integrity & insulation) (Type 1)

FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum stress allowance of threaded steel rod hangers	Test assessment report no. (BS 476: Part 20: 1987)
-/60/60	PH.50.60-CS	9mm	50mm x 60kg/m³	15N/mm²	RED R23J17-1A issue 1
-/120/120	PH.50.12-CS			10N/mm²	
-/120/120	PH.50.12-CS	12mm	50mm x 100kg/m³	10N/mm²	RED R24B21-1A

For integrity and insulation



Hanger and stud fixing

1. One layer of PROMATECT®-H board, thickness and mineral wool requirements in accordance with above table.

   100mm wide PROMATECT®-H collars, thickness in accordance with above table, fitted around the enclosure on both sides of the wall forming an L shape (see details on page 13), is required where the enclosure penetrates a fire compartment wall.
2. Minimum 50mm x 50mm x 0.8mm thick galvanised steel channels coinciding with board joints at nominal 1220mm centres.
3. Galvanised steel angles, size in accordance with below table, at corner joints.

FRR	For one, two, three and four sided construction
-/60/60	Min. 50mm x 50mm x 0.8mm thick
-/120/120	Min. 50mm x 50mm x 1.0mm thick

4. Threaded steel rod hangers, maximum stress allowance in accordance with above table.
5. Galvanised steel angle (size varies in accordance with weight and dimensions of the enclosure and maximum stress allowance of the hangers).
6. Galvanised steel angle (size calculation in accordance with weight and dimensions of the services and maximum stress allowance of the hangers) and threaded steel rod hanger to support the services.
7. M4 self-tapping screws at nominal 200mm centres.
8. Caulk all penetration gaps with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.
9. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.

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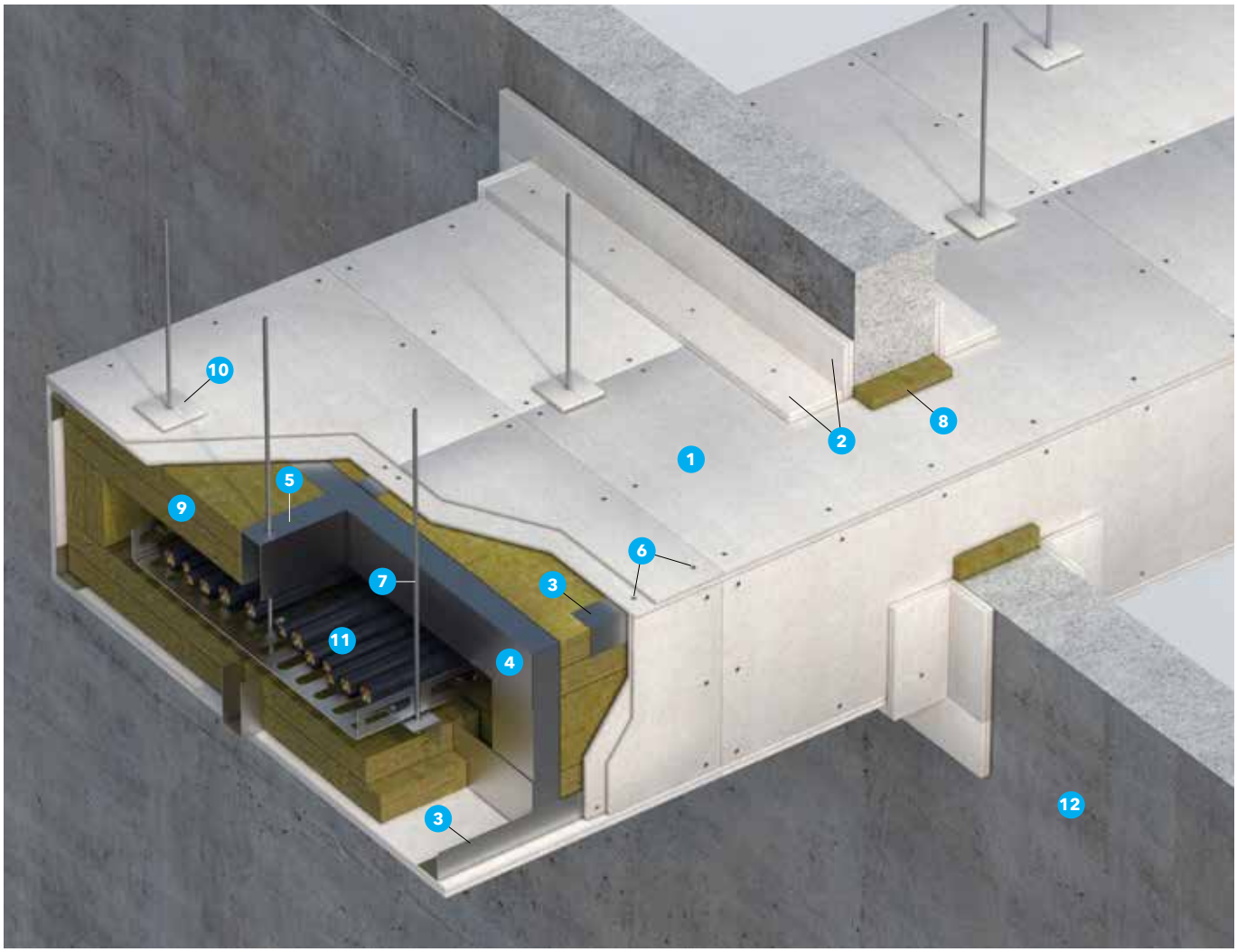
PROMATECT®-H M&E services enclosure (Integrity & insulation) (Type 2)

FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum stress allowance of threaded steel rod hangers	Test assessment report no. (BS 476: Part 20: 1987)
-/240/240	PH.50.24-CS	2 x 9mm	2 x 50mm x 100kg/m³	6N/mm²	RED R22C10-1A issue 1



1. PROMATECT®-H board 2 x 9mm thick.
2. PROMATECT®-H collar 2 x 9mm thick.
3. Min. 50 x 50 x 1mm thick steel angles at corner joints.
4. Min. 100 x 50 x 100 x 1mm thick steel channel collar frame (folded around) at nominal 610mm centres.
5. Min. 100 x 50 x 100 x 1mm thick steel channel.
6. M4 self-tapping screws at nominal 200mm centres.
7. Max. 6N/mm² stress allowance cable tray steel hanger.
8. Mineral wool pack 100kg/m³
9. Mineral wool 2 x 50mm thick x 100kg/m³.
10. 75 x 75 x 9mm thick PROMATECT®-H cover plates or all penetration gaps of rod hangers caulked with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.
11. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.
12. Concrete or masonry wall.

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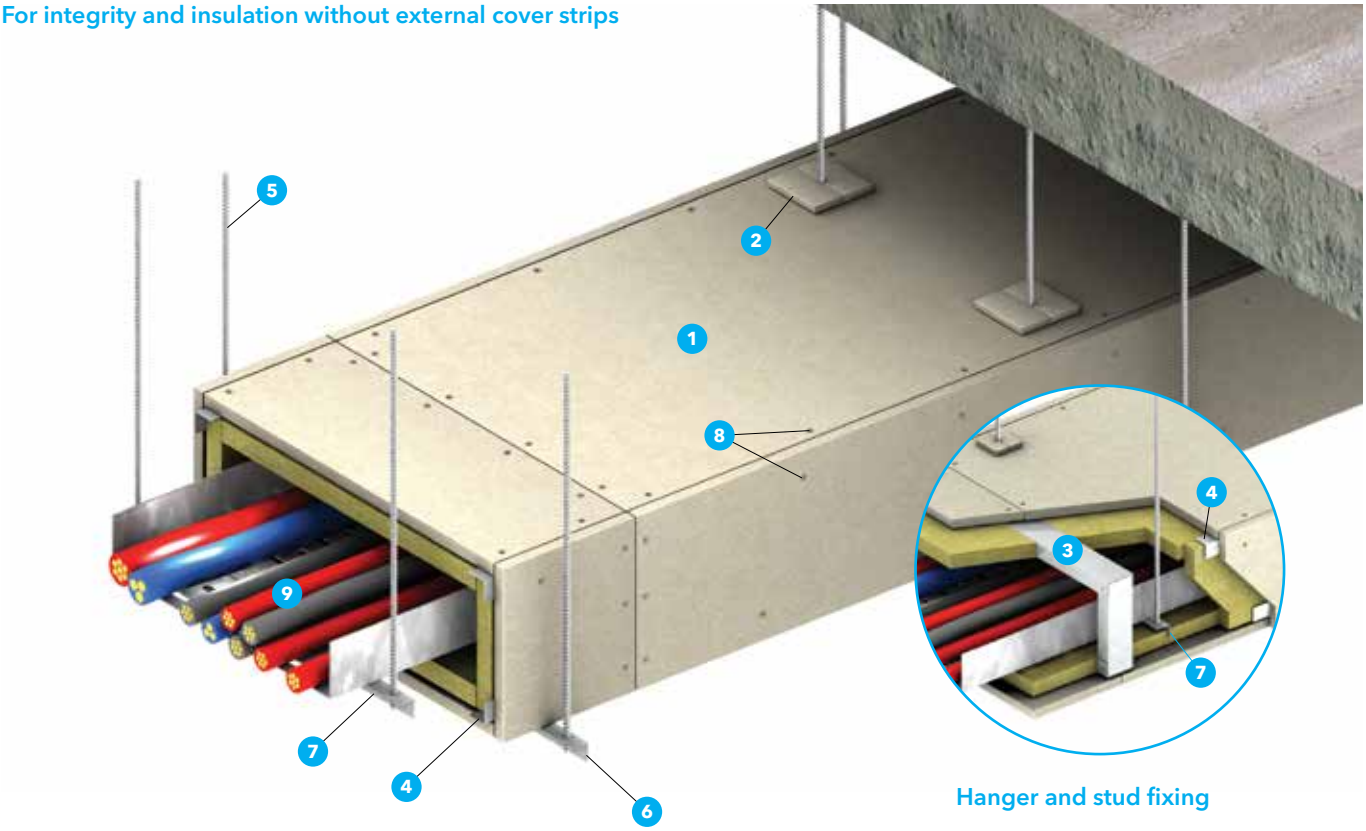
PROMINA® 60 M&E services enclosure (Integrity & insulation)

FRR	Model number	Board / Cover plate/ Collar thickness	Mineral wool thickness x density	Maximum stress allowance of threaded steel rod hangers	Test assessment report no. (BS 476: Part 20: 1987)
-/60/60	PMF.50.60	9mm	50mm x 60kg/m³	15N/mm²	RED R23D34-1A

For integrity and insulation without external cover strips



Hanger and stud fixing

1. One layer of 9mm thick PROMINA® 60 board with one layer of 50mm x 100kg/m³ mineral wool.
2. 75mm x 75mm PROMINA® 60 cover plates or all penetration gaps of rod hangers caulked with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.

   100mm wide x 9mm thick PROMINA® 60 collars, fitted around the enclosure on both sides of the wall forming an L shape (see details on page 13), is required where the enclosure penetrates a fire compartment wall.
3. Minimum 50mm x 30mm x 0.6mm thick galvanised steel channels coinciding with board joints at nominal 1220mm centres.
4. Minimum 50mm x 50mm x 0.5mm thick galvanised steel angles at corner joints for one, two or three sided construction.
5. Threaded steel rod hangers, maximum stress allowance 15N/mm².
6. Galvanised steel angle (size varies in accordance with weight and dimensions of the enclosure and maximum stress allowance of the hangers).
7. Galvanised steel angle (size calculation in accordance with weight and dimensions of the services and maximum stress allowance of the hangers) and threaded steel rod hanger to support the services.
8. M4 self-tapping screws at nominal 200mm centres.
9. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.

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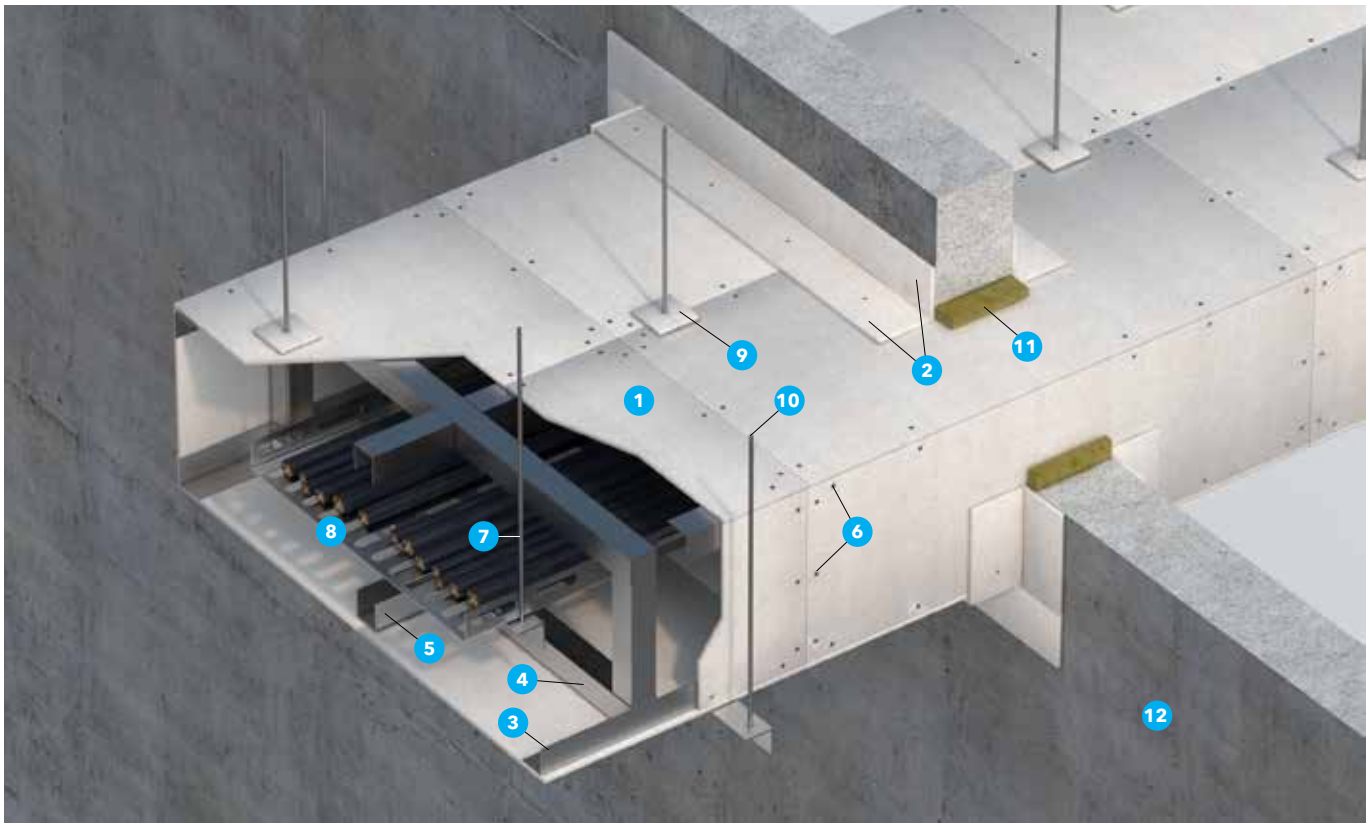
PROMATECT®-H M&E services enclosure (Integrity only)

FRR	Model number	Board / Collar thickness	Galvanised steel channels	Maximum stress allowance of threaded steel rod hangers	Test assessment report no. (BS 476: Part 20: 1987)
-/60/-	PH.50.60E	9mm	50 x 25 x 0.5mm thick	10N/mm²	RED R22J25-1A
-/120/-	PH.50.12E				
-/240/-	PH.50.24E	12mm	50 x 25 x 0.7mm thick	6N/mm²	



1. One layer of PROMATECT®-H board. Refer to Table 1.
2. PROMATECT®-H collar. Refer to Table 1.
3. Steel angles at corner joints. Refer to Table 1.
4. Steel channel collar frame (folded around) at nominal 1220mm centres. Refer to Table 2 and Table 3.
5. Steel channel. Refer to Table 1.
6. M4 self-tapping screws at nominal 200mm centres.
7. Cable tray steel hanger at nominal 1830mm centres. Refer to Table 1.
8. Steel cable tray.
9. PROMATECT®-H cover plates. Refer to Table 1. Or seal gaps with PROMASEAL® Intumescent Acrylic Sealant.
10. Enclosure steel hanger at nominal 1220mm centres. Refer to Table 1.
11. Mineral wool pack 110kg/m³.
12. Concrete or masonry wall.

Table 1

	-/60/- & -/120/-	-/240/-
1 Boards thickness	9mm	12mm
2 Collar size	100mm wide x 9mm thick	100mm wide x 12mm thick
3 Steel Angles	Min. 30 x 30 x 0.5mm thick	Min. 30 x 30 x 0.7mm thick
5 Steel Channel	Min. 50 x 25 x 0.5mm thick	Min. 50 x 25 x 0.7mm thick
7 Cable tray steel hanger (max. stress)	10N/mm²	6N/mm²
9 PROMATECT®-H cover plates	75 x 75 x 9mm thick	75 x 75 x 9mm thick
10 Enclosure steel hanger (max. stress)	10N/mm²	6N/mm²

Table 2: Channel size for -/60/- & -/120/-

Type of Enclosure	Enclosure Size	Channel Size
3, 2, 1 Sided	Max. 6000mm wide x 1220mm high	50 x 25 x 0.5mm thick
4 Sided	Max. 2440mm wide x 1220mm high	50 x 25 x 0.5mm thick
4 Sided	Max. 3000mm wide x 1500mm high	50 x 50 x 0.8mm thick

Table 2: Channel size for -/240/-

Type of Enclosure	Enclosure Size	Channel Size
3, 2, 1 Sided	Max. 3660mm wide x 1220mm high	50 x 25 x 0.7mm thick
4 Sided	Max. 1220mm wide x 6100mm high	50 x 25 x 0.7mm thick
4 Sided	Max. 3000mm wide x 1500mm high	50 x 50 x 1.2mm thick

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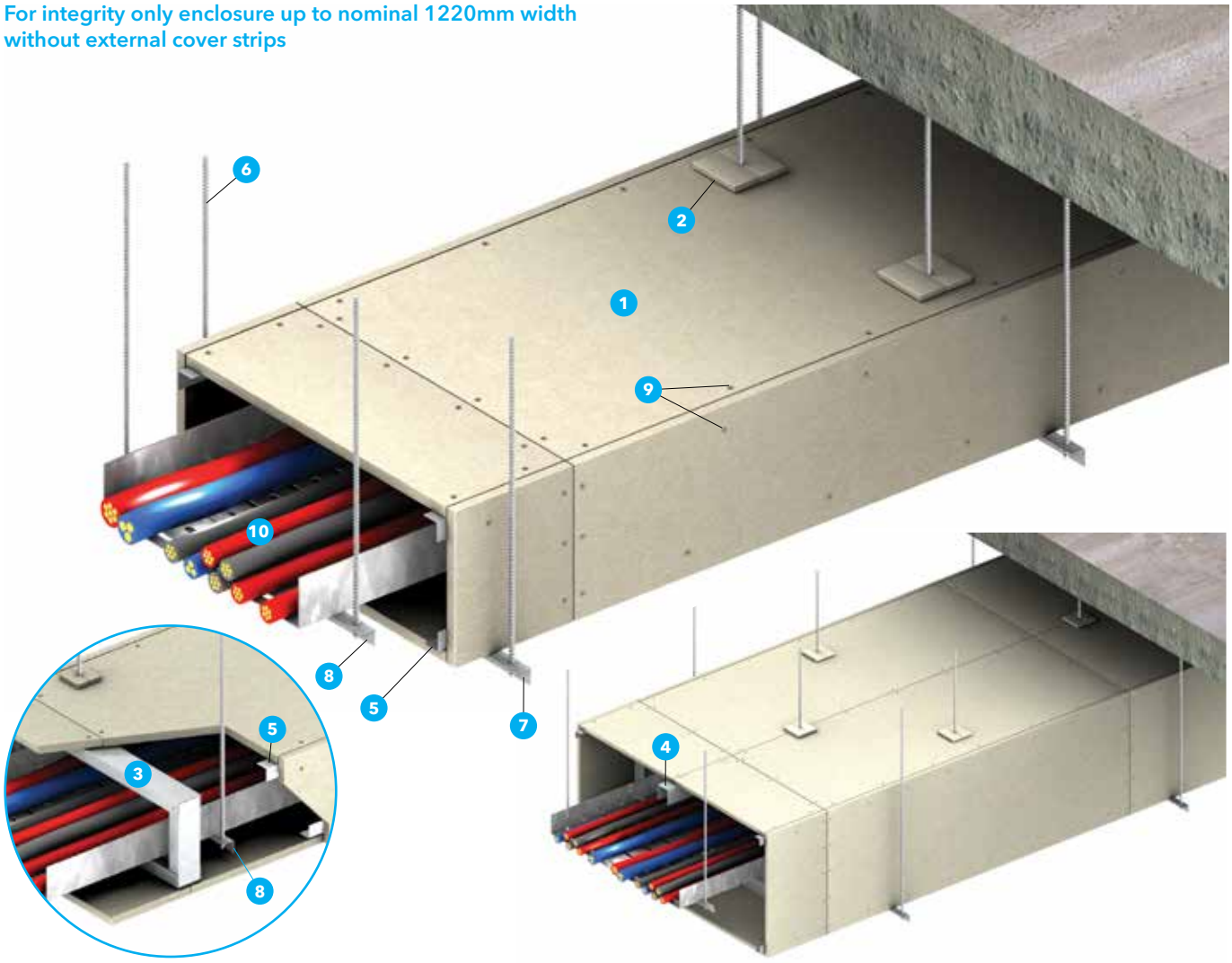
PROMINA® 60 M&E services enclosure (Integrity only)

FRR	Model number	Board / Collar thickness	Galvanised steel channels	Maximum stress allowance of threaded steel rod hangers	Test assessment report no. (BS 476: Part 20: 1987)
-/120/-	PMF.50.12E	9mm	50 x 25 x 0.6mm thick	10N/mm²	RED R23D33-1A

For integrity only enclosure up to nominal 1220mm width without external cover strips



Hanger and stud fixing

Typical double or large span enclosure

1. One layer of 9mm thick PROMINA® 60 board.
2. 75mm x 75mm x 9mm thick PROMINA® 60 cover plates or all penetration gaps of rod hangers caulked with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.

   100mm wide x 9mm thick PROMINA® 60 collars, fitted around the enclosure on both sides of the wall forming an L shape (see details on page 13), is required where the enclosure penetrates a fire compartment wall.
3. 50mm x 25mm x 0.6mm thick galvanised steel channels coinciding with board joints at nominal 1220mm centres.
4. 50mm x 25mm x 0.6mm thick galvanised steel channels at middle span of the enclosure as additional support.
5. Minimum 50mm x 50mm x 0.5mm thick galvanised steel angles at corner joints.
6. Threaded steel rod hangers, maximum stress allowance 10N/mm².
7. Galvanised steel angle (size varies in accordance with weight and dimensions of the enclosure and maximum stress allowance of the hangers).
8. Galvanised steel angle (size calculation in accordance with weight and dimensions of the services and maximum stress allowance of the hangers) and threaded steel rod hanger to support the services.
9. M4 self-tapping screws at nominal 200mm centres.
10. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.

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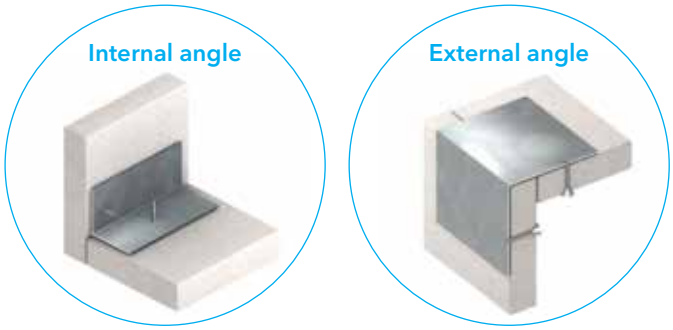
PROMATECT®-H and PROMINA® 60 M&E services enclosure

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 20mm or thicker boards are used as the boards can be fixed to each other using deep threaded, self-tapping or drywall type screws, or steel wire staples.



Four sided galvanised steel channel collars are positioned at approximately 1220mm centres to support the boards. The steel channels are minimum 50mm x 25mm x 0.5mm thick and up to 50mm x 50mm x 1.2mm thick depending on the system specification.

Steel framework for enclosure

Fixing of boards and mineral wool

Selection of board types and thicknesses is subject to the system specification and the required fire resistance level. The boards are fastened to channels (framing) and corner angles with self-tapping screws of appropriate length at 200mm nominal centres. For systems where corner angles are not required (e.g. 20mm or thicker boards), the boards should be fastened at the corners with self-tapping screws at 200mm nominal centres or staples at 100mm nominal centres as below:

Board thickness	Steel self-tapping screws at 200mm centres	Steel wire staples at 100mm centres
9mm	25mm x No.6	–
15mm	30mm x No.6	–
20mm	38mm x No.6	63/10/1.0
50mm	100mm x No.10	80/12/2.0

Longitudinal joints in the boards (other than the corner joints) must be backed by a collar formed by steel channels. All butt joints, as required by system specification, should be placed with cover strips internally or externally.

Cavity between the boards and the services, as well as in the channels, should be filled with mineral wool according to the system specification. See illustrations here for example.

Support for services and enclosure

The threaded steel rod hangers used to support the M&E services enclosure must have maximum tensile and bending stresses of 15N/mm², 10N/mm² and 6N/mm² for up to -/60/60, 120/120/120 and 240/240/240 respectively. If the stress allowance is exceeded, size of the hanger members must be increased. Alternatively, reduce spacing of the hangers.

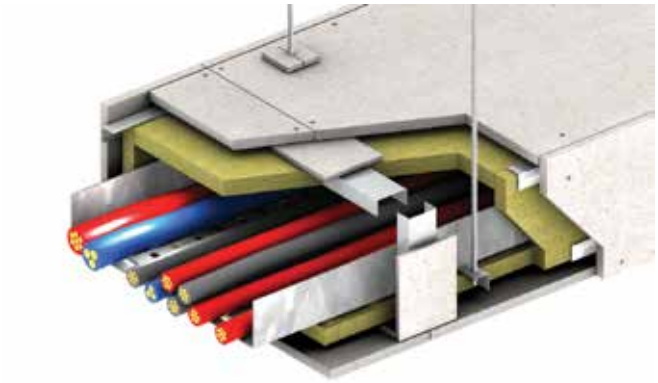
All fixings for fastening the hanger rods to concrete soffits must be all steel anchor bolts of minimum 80mm length penetrating into the concrete at least 40mm for -/120/120 and at least 60mm for -/240/240. These anchor bolts must match the size of the hanger rods for sufficient strength to support the enclosure weight according to the manufacturer's specification.

Where the hanger rods are suspended from a protected structural steel beam, they must be at least 300mm from the beam in the same fire resistance levels.

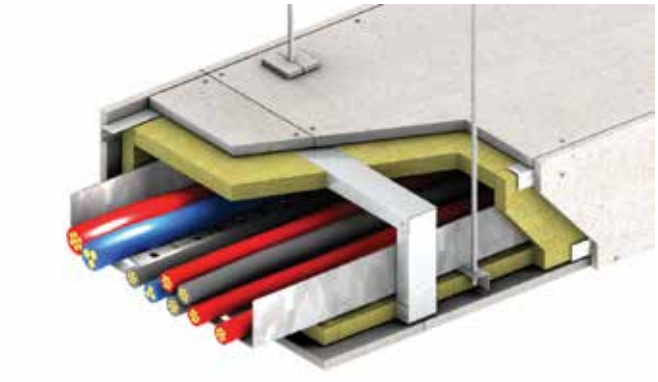
Where the hanger rods exceed 2000mm in length, they should be cladded with a material of similar thickness as the enclosure to prevent excessive thermal expansion.

Where the hanger rods emerge from the enclosure, the hole (slot) must be sealed with PROMASEAL® Intumescent Acrylic Sealant, with or without a cover plate, depending on size of the penetration gaps.

For enclosure of plastic pipes, external hanger rods and angles are required to support the enclosure independently.



Longitudinal board joints placed with an internal cover strip and backed by a collar



Longitudinal board joints placed with an external cover strip and backed by a collar

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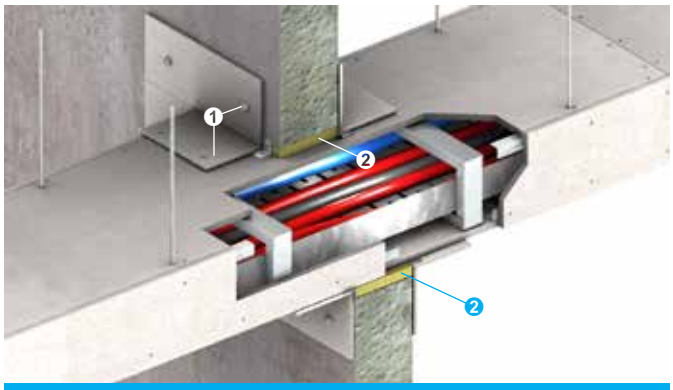
PROMATECT®-H and PROMINA® 60 M&E services enclosure

Wall penetration

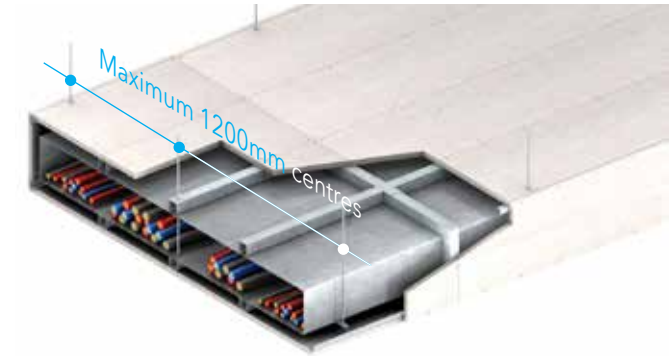
Where an M&E services enclosure passes through a fire compartment wall, the penetration must be properly constructed and sealed. At the penetration, any gaps up to 20mm wide may be sealed with mineral wool and PROMASEAL® Intumescent Acrylic Sealant. For wider gaps, a PROMATECT®-H or PROMINA® 60 collar must be fitted around the enclosure on both sides of the wall forming an L shape using M6 anchor bolts at nominal 600mm centres. The minimum collar dimensions should be 150mm wide x 20mm thick.



1. Minimum 150mm wide x 20mm thick PROMATECT®-H or PROMINA® 60 collar for wall penetration gap exceeding 20mm width.
2. Mineral wool tightly packed into aperture between substrate and surface of the cable duct enclosure.

Internal cross section dimensions

The approved maximum internal dimension of the enclosure is 6000mm width x 2500mm height. For enclosure with internal dimension greater than 1500mm x 1500mm, additional threaded steel rod hanger (which passes through the enclosure and supports the galvanised steel angle beneath the enclosure) must be fitted and positioned at mid width of the enclosure at maximum 1220mm centres. All penetration gaps of the rods through the enclosure should be caulked with PROMASEAL® Intumescent Acrylic Sealant.



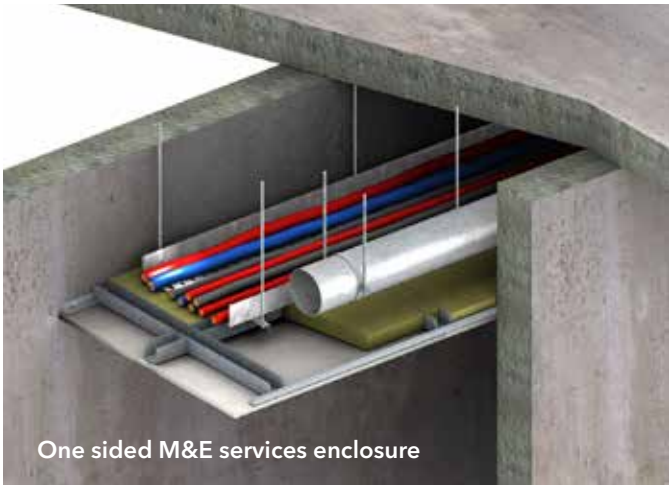
Example of a wide enclosure up to 6000mm x 2500mm

For wider enclosure, the rod hanger also serves to support the top of the enclosure using a nut and large steel washer to prevent bowing in the event of fire. As the enclosure width increases, the spacing between collars (formed by steel channels) must be reduced so that the maximum unsupported area of board does not exceed 1.5m².

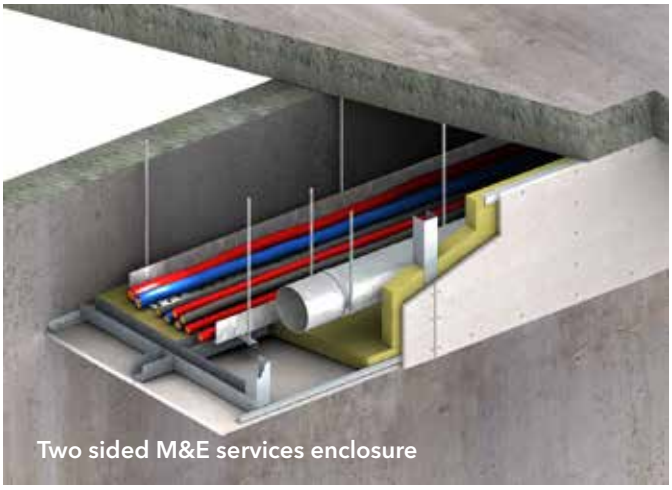
One, two or three sided protection

One, two or three sided enclosure is constructed in the same manner as four sided enclosure. Galvanised steel angles are fastened to the floor or wall slab using all steel anchor bolts at nominal 500mm centres.

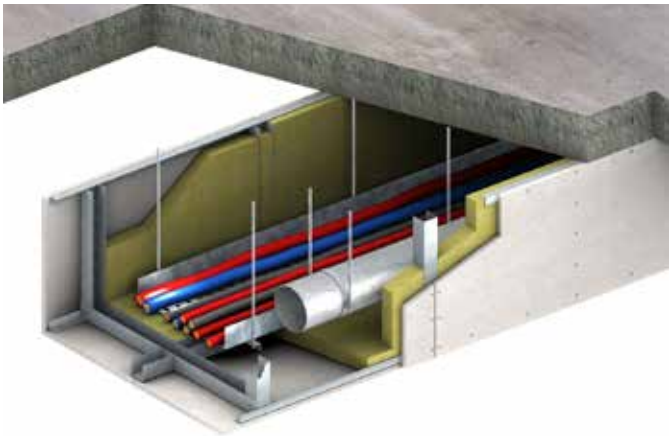
PROMATECT®-H or PROMINA® 60 boards forming the enclosure are fixed to the angles with self-tapping screws at 200mm nominal centres or steel wire staples at 100mm nominal centres. The services within are supported independently.



One sided M&E services enclosure



Two sided M&E services enclosure



Three sided M&E services enclosure

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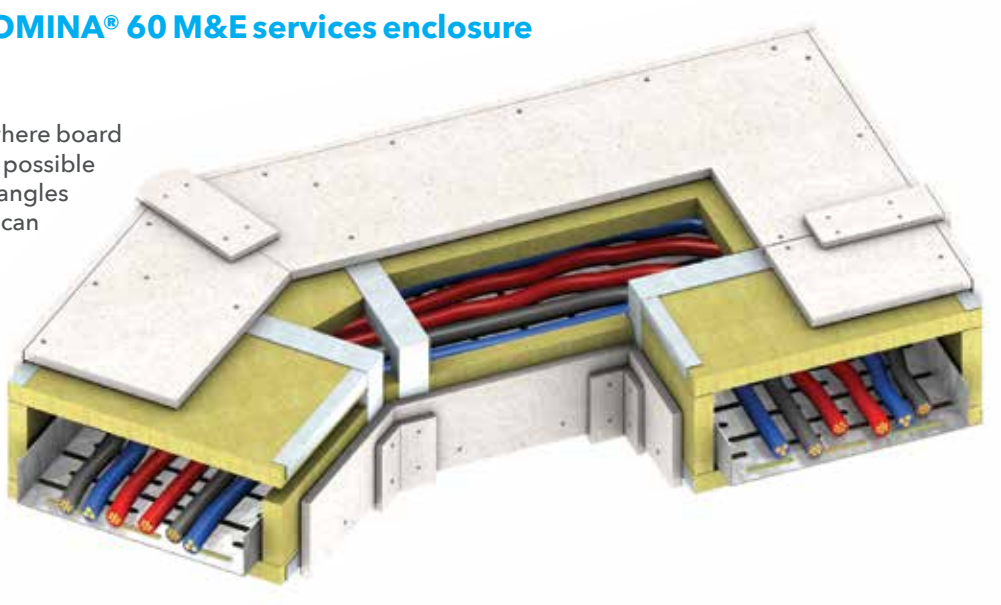
PROMATECT®-H and PROMINA® 60 M&E services enclosure

Transformation section

In typical transformation section, where board joints abut at an angle and it is not possible to back the joint with channels, angles bent to the appropriate degree can be used to back these joints.

The steel channels should always be placed to limit the total unsupported area of board to maximum 1.5m². Bent or curved shapes must be supported with rod hangers at mid span of the enclosure.



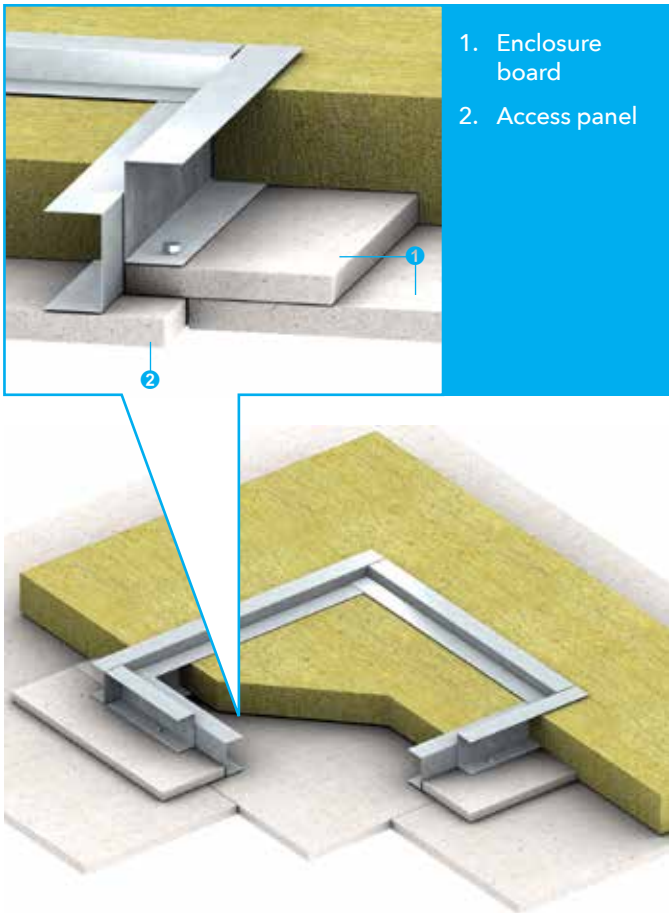
Vertical enclosure

The construction manner is similar in both vertical and horizontal enclosures. Where a vertical enclosure is located adjacent to a wall, the enclosure should be restrained back to the wall with threaded rods and support sections.

The weight of the entire enclosure assembly must be fully supported at each floor level. Steel angles may be fitted to the enclosure at floor penetration level and seated on the floor slab, supporting the weight of the enclosure.

Access panels

Maximum dimension allowed for access panels within M&E services enclosure is 600mm x 600mm. An access panel must be fixed to the enclosure through steel channels, using steel bolts and nuts at nominal 200mm centres with the board thickness and the mineral wool requirements according to system specification. The mineral wool can be encapsulated within the channel sections of which are fixed to the access panel using self-tapping screws.



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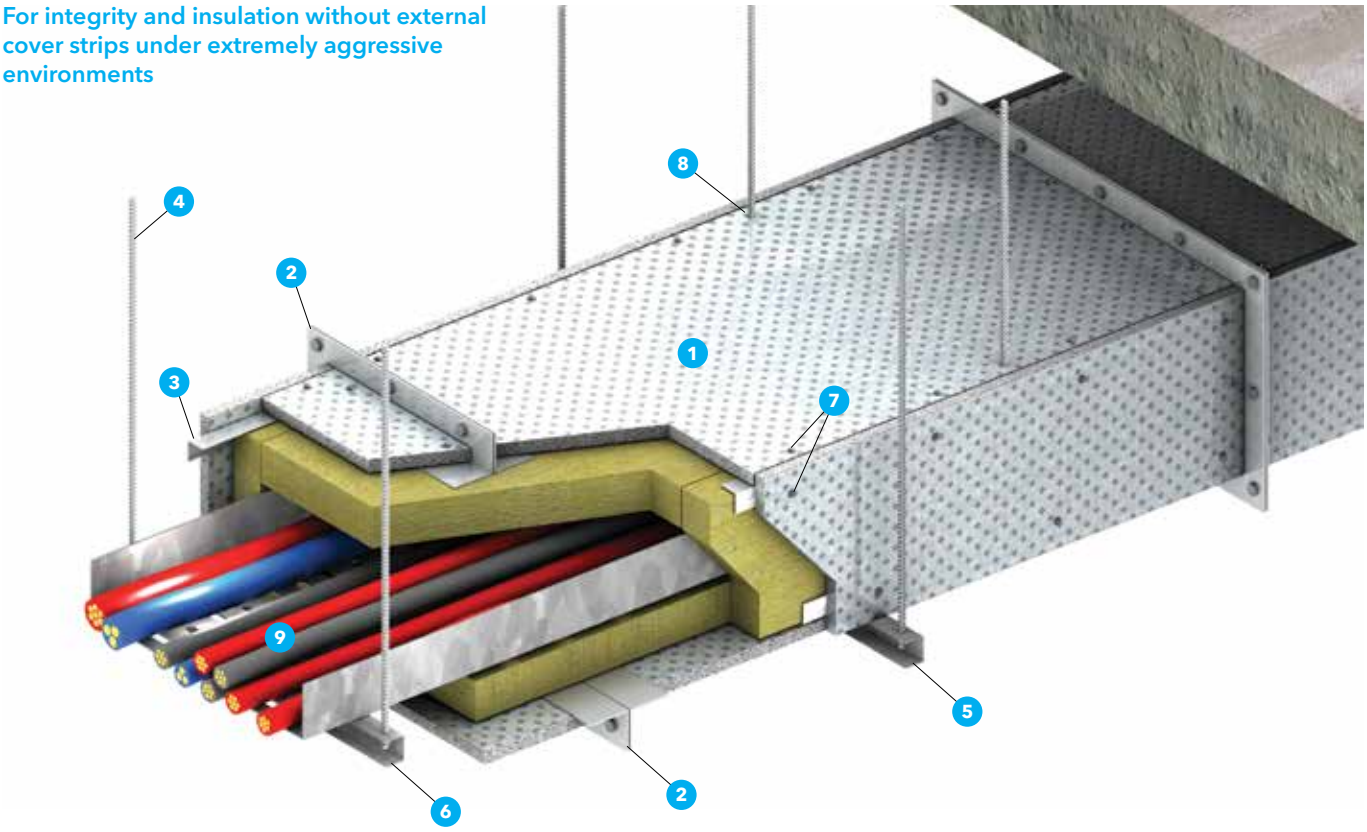
PROMATECT®-S M&E services enclosure (Integrity & insulation)

FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum stress allowance of threaded steel rod hangers	Maximum size width x height	Test assessment report no. (BS 476: Part 20: 1987)
-/120/120	PS.50.12	6mm	80mm x 140kg/m³	10N/mm²	3000mm x 1500mm	RED R23D19-1A
-/240/240	PS.50.24	9.5mm	120mm x 140kg/m³	6N/mm²	3000mm x 800mm	

For integrity and insulation without external cover strips under extremely aggressive environments



1. One layer of PROMATECT®-S board, thickness and mineral wool requirements in accordance with above table.

   100mm wide PROMATECT®-S collars, thickness in accordance with above table, fitted around the enclosure on both sides of the wall forming an L shape (see details on page 185), is required where the enclosure penetrates a fire compartment wall.
2. Fabricated flanges with two units of cut and welded 50mm x 50mm x 3mm thick galvanised steel angles, bolted together using M10 nuts and bolts at nominal 200mm centres to form a continuous section around the enclosure.
3. 50mm x 50mm x 3mm thick galvanised steel angles for corner reinforcement purposes (no mechanical fixing required).
4. Threaded steel rod hangers, maximum stress allowance in accordance with above table, at maximum 1800mm centres.
5. Galvanised steel angle (size varies in accordance with weight and dimensions of the enclosure and maximum stress allowance of the hangers).
6. Galvanised steel angle (size calculation in accordance with weight and dimensions of the services and maximum stress allowance of the hangers) and threaded steel rod hanger to support the services.
7. 35mm long 5.5mm Teks steel self-tapping screws at nominal 200mm centres.
8. Caulk all penetration gaps with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.
9. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.

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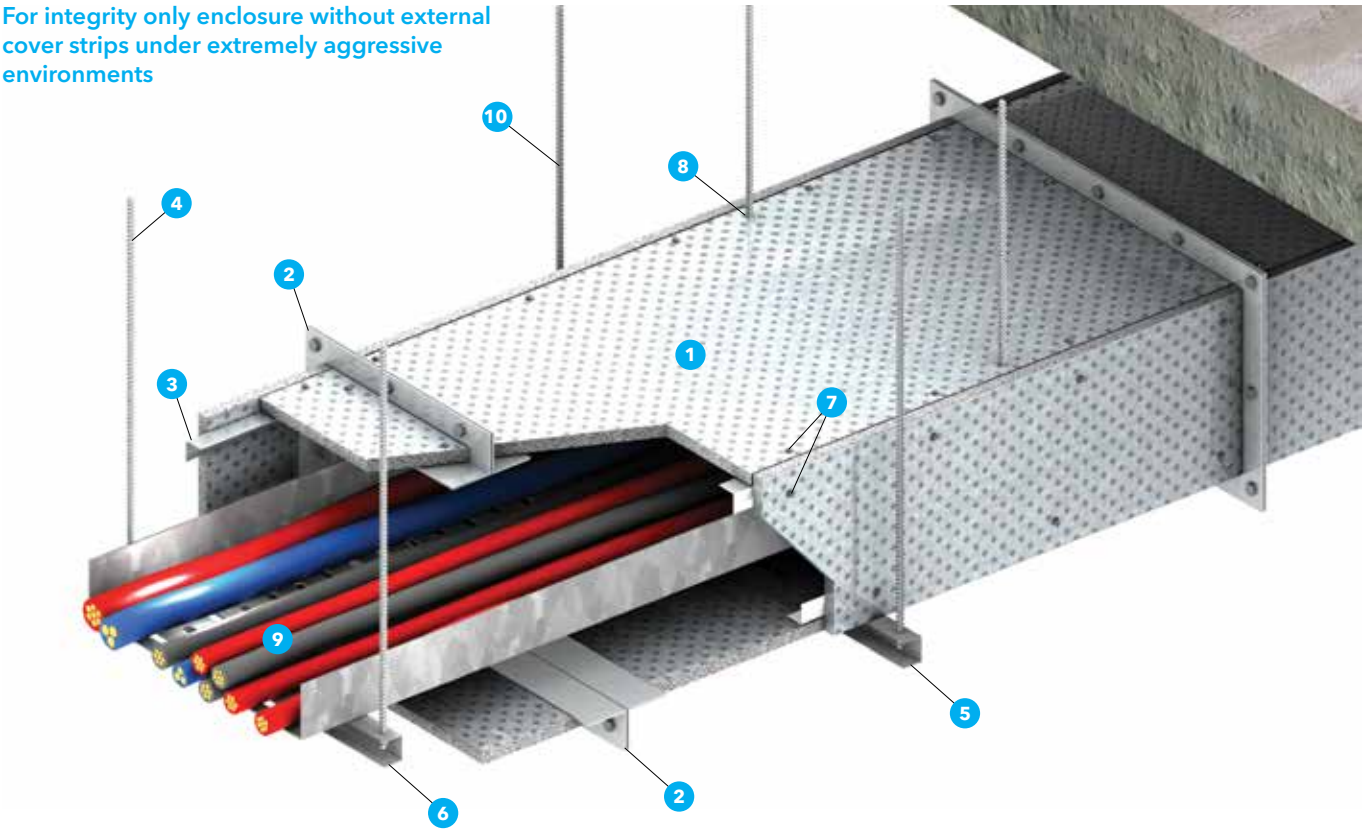
PROMATECT®-S M&E services enclosure (Integrity only)

FRR	Model number	Board thickness	Galvanised steel channels	Maximum stress allowance of threaded steel rod hangers	Maximum size width x height	Test assessment report no. (BS 476: Part 20: 1987)
-/120/-	PS.50.12E	6mm	50 x 50 x 3mm thick	10N/mm²	1500mm x 1500mm	BRE CC 277369 Review 2 Issue 1
			50 x 50 x 5mm thick		2000mm x 2000mm	
-/240/-	PS.50.24E	9.5mm	*See below note	6N/mm²	6000mm x 2000mm	

*For enclosure -/120/- or -/240/- with internal width greater than 2400mm, additional framing of double 50mm x 50mm x 3mm thick galvanised steel angles (back to back) or 50mm x 50mm x 6mm thick T-section is required at all intermediate longitudinal board joints.

For integrity only enclosure without external cover strips under extremely aggressive environments



1. One layer of PROMATECT®-S board, thickness in accordance with above table.

   100mm wide PROMATECT®-S collars, thickness in accordance with above table, fitted around the enclosure on both sides of the wall forming an L shape (see details on page 185), is required where the enclosure penetrates a fire compartment wall.
2. Fabricated flanges with two units of cut and welded 50mm x 50mm x 3mm thick galvanised steel angles, bolted together using M10 nuts and bolts at nominal 500mm centres to form a continuous section around the enclosure.
3. Galvanised steel angles, size in accordance with above table, for corner reinforcement purposes (no mechanical fixing required).
4. The M&E services must be supported by steel hanger at maximum 2400mm centres in accordance with about table.
5. Galvanised steel angle (size varies in accordance with weight and dimensions of the enclosure and maximum stress allowance of the hangers).
6. Galvanised steel angle (size calculation in accordance with weight and dimensions of the services and maximum stress allowance of the hangers) and threaded steel rod hanger to support the services.
7. 35mm long 5.5mm Teks steel self-tapping screws at nominal 200mm centres.
8. Caulk all penetration gaps with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.
9. General M&E services, e.g. electrical cables, steel cable tray, steel pipes etc.
10. The enclosure system to be supported by steel hangers at maximum 1500mm centres in accordance with above table.

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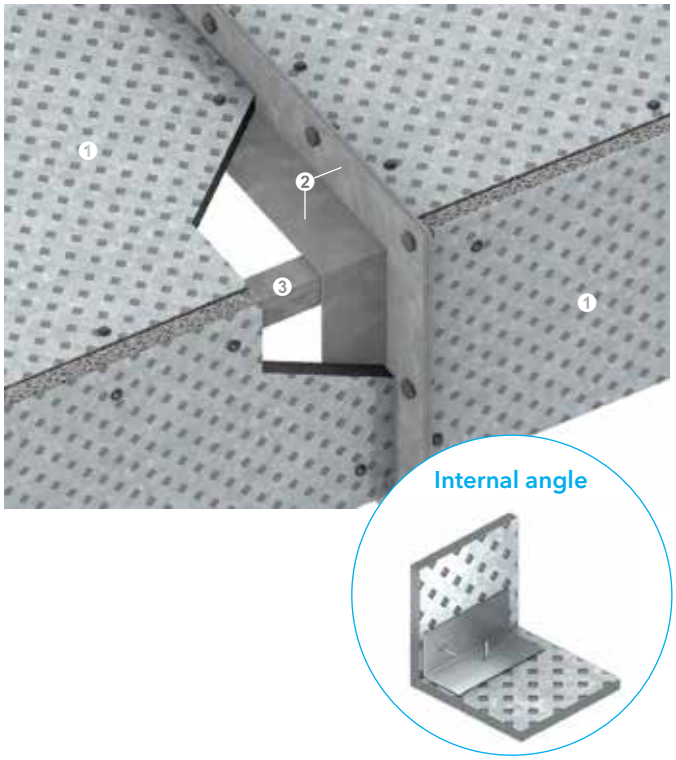
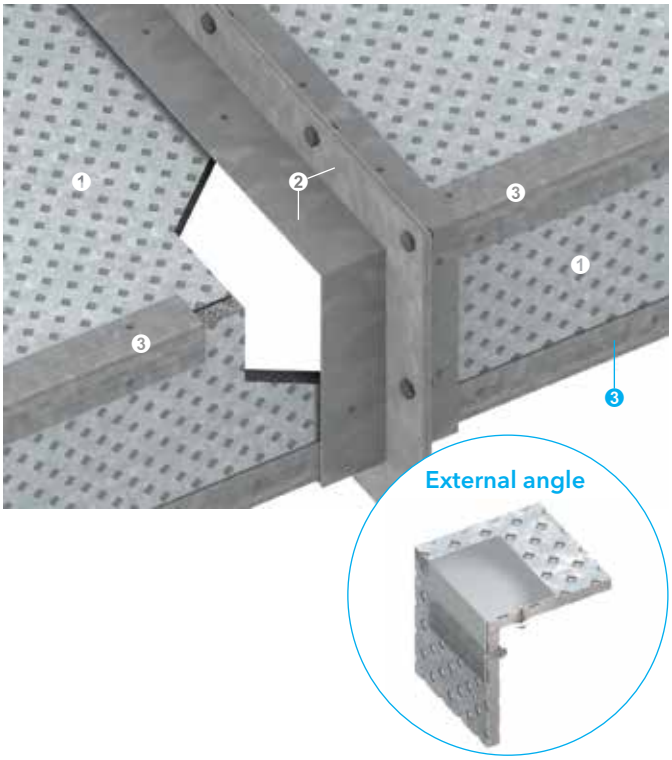
PROMATECT®-S M&E services enclosure

Steel framework

Corner junctions of the M&E services enclosure are reinforced with internal steel angle of minimum 50mm x 50mm x 3mm thickness. PROMATECT®-S board is connected with 35mm long 5.5mm Teks steel self-tapping screws at 200mm centres. Transverse board joints are connected in the same manner using 100mm x 3mm thick steel flat sheet.



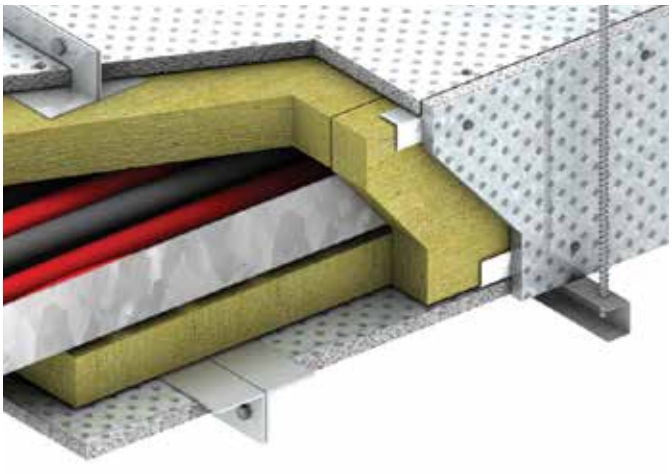


1. One layer of 6mm or 9.5mm thick PROMATECT®-S board depending on the required fire resistance level.
2. Fabricated flanges with two units of cut and welded 50mm x 50mm x 3mm thick galvanised steel angles, bolted together using M10 nuts and bolts at nominal 500mm centres to form a continuous section around the enclosure.
3. Galvanised steel angles, size in accordance with the table on pages 15 and 16 depending on the required fire resistance level, for corner reinforcement purposes (no mechanical fixing required).

Fitting of mineral wool

Mineral wool insulation is laid in the soffit boards of the enclosure. For the top and sides, however, the insulation is fixed in place using steel self-tapping screws with 25mm diameter steel washers at nominal 300mm centres in a grid formation.

If the insulation is fitted in two or more layers of mineral wool, the joints between the slabs should be staggered by at least 300mm between the layers. If the insulation is fitted in single layer mineral wool, the joints between slabs are sealed and bonded together using VICUBOND® WR adhesive.



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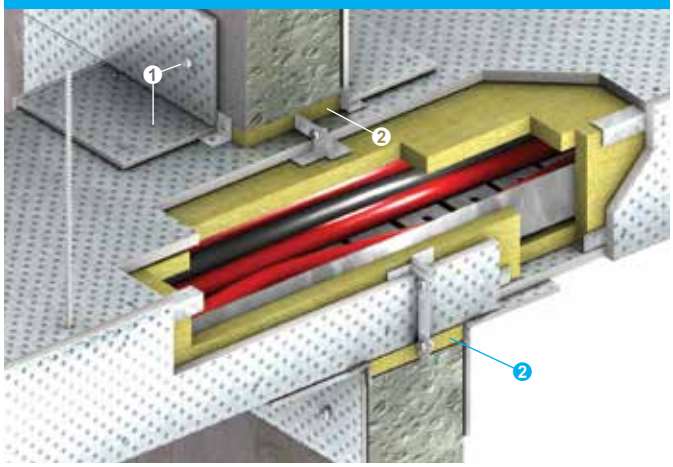
PROMATECT®-S M&E services enclosure

Wall penetration

Where an M&E services enclosure passes through a fire compartment wall, the penetration must be properly fire resistant. 50mm x 50mm x 3mm thick steel angles are fixed to the top and sides of the enclosure and set in a position central to the compartment wall thickness. The wall aperture must be covered by PROMATECT®-S collars fitted around the enclosure on both sides of the wall forming an L shape using all steel anchor bolts at nominal 500mm centres. The collar should be minimum 100mm in width, overlapping the enclosure surface and the wall aperture.

1. Minimum 100mm wide x 6mm or 9.5mm thick PROMATECT®-S collar for wall penetration gap
2. 140kg/m³ mineral wool tightly packed into aperture between substrate and surface of the cable duct enclosure



Internal cross section dimensions

The approved maximum internal dimension of the enclosure is 2500mm width x 500mm height. Width of the enclosure may be increased to 3000mm with additional rod hanger, fitted and positioned at mid width of the enclosure, which passes through the enclosure and supports the galvanised steel angle beneath the enclosure. The rod hanger also supports the top of the enclosure with a nut and large steel washer on each side of the board. All penetration gaps of the rods through the enclosure should be caulked with PROMASEAL® Intumescent Acrylic Sealant.

Support for services and enclosure

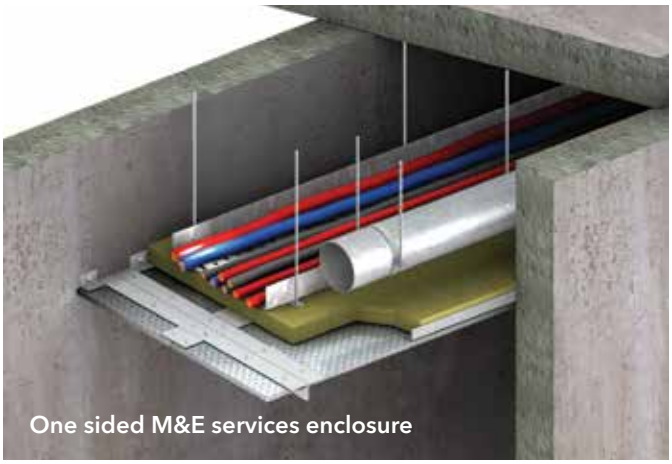
The threaded steel rod hangers used to support the M&E services enclosure must have maximum tensile and bending stresses of 10N/mm² and 6N/mm² for up to -/120/120 and -/240/240 respectively. If the stress allowance is exceeded, size of the hanger members must be increased. Alternatively, reduce spacing of the hangers. Maximum spacing of the hangers is 1800mm centres subject to the individual section lengths.

All fixings for fastening the hanger rods to concrete soffits must be all steel anchor bolts penetrating into the concrete at least 40mm for 120/120/120 and at least 60mm for 240/240/240. These anchor bolts must match the size of the hanger rods for sufficient strength to support the enclosure weight according to the manufacturer's specification.

Where the hanger rods are suspended from a protected structural steel beam, they must be at least 300mm from the beam in the same fire resistance levels. For enclosure of plastic pipes, external hanger rods and angles are required to support the enclosure independently.

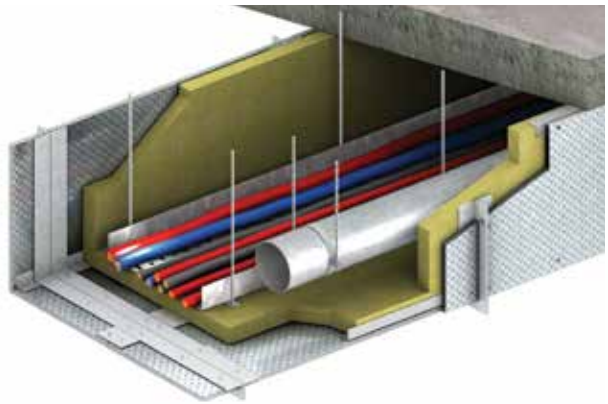
One, two or three sided protection

One, two or three sided enclosure is constructed in the same manner as four sided enclosure. PROMATECT®-S board is connected to floor or wall slab with steel angles using Teks steel self-tapping screws and all steel anchor bolts at 500mm maximum centres. The anchor bolts must have a minimum 60mm of penetration into the floor or wall. The services within are supported independently.



One sided M&E services enclosure

Two sided M&E services enclosure



Three sided M&E services enclosure

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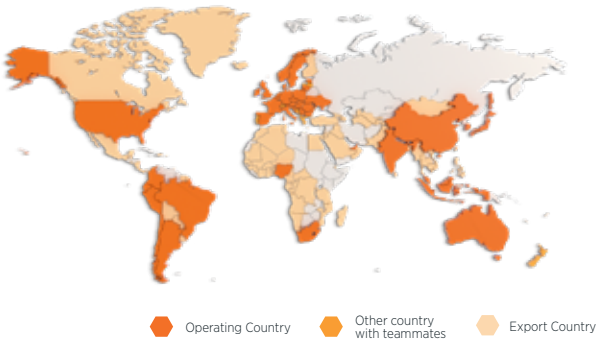
Founded in 1905, headquartered in Zaventem, Belgium, Etex is a family-owned company with more than 13,500 employees globally. It operates more than 160 sites in 45 countries and recorded a revenue of EUR 3.8 billion in 2023. Etex fosters a collaborative and caring culture, a pioneering spirit and a passion to always do better for its customers.



Etex has five R&D centres supporting four global divisions:

- Building Performance: dry construction solutions including plasterboards and fibre cement boards, plasters and formulated products, passive fire protection and associated products.
- Exteriors: a range of aesthetic fibre cement materials for use in agriculture, architectural and residential exteriors.
- Industry: fire protection and high-performance insulation products for the construction and OEM (Original Equipment Manufacturer) industries.
- Insulation: glass mineral wool and extruded polystyrene (XPS) for thermal and acoustic insulation.

Etex's global portfolio includes leading commercial brands such as Promat, Kalsi, Siniat, Equitone, Eternit, Cedral, Durlock, Gyplac, Pladur, Superboard, Remagin, Skamol and URSA.

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