

Promat



Ventilation & Smoke Extraction

Passive Fire Protection

Ventilation & Smoke Extraction Ducts

Handbook

Hong Kong version



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The relative complexity of any ductwork system passing through different fire compartment and the relevance of the system's function in ambient as well as fire conditions can make the selection of a suitable ductwork system difficult.

This chapter aims to give some guidance on the fire performance requirements of ductwork and offers a wide range of solutions for the protection of steel ductwork and self-supporting duct systems using PROMATECT®-H.

For particularly onerous conditions, e.g. where high impact strength is required for use in aggressive environments, Promat recommends a high impact range of ductwork systems using PROMATECT®-S boards.

Fire resistant test standards

To determine the fire resistance of ducts (without the aid of fire dampers) passing through or between compartments, the system should normally be tested or assessed in accordance with BS 476: Part 24 and BS EN 1366: Parts 1, 5 & 8.

These standards have been written specifically for ventilation ducts, but guidance is also given in these standards of the performance requirements for "smoke outlet" and "kitchen extract" ducts.

As part of a standard fire test according to BS 476: Parts 20 & 24, duct systems are exposed to external fire (also known as Duct Type A) and one sample to both external and internal fire (also known as Duct Type B). Fans attached create a standard pressure difference and air flow and the duct's fire performance is assessed in both fan-on and fan-off situations. When testing horizontal ducts, a run of at least 3000mm is located within the fire compartment (both EN and ISO standards require a 4000mm length exposure) and a further 2500mm outside the fire compartment.

BS 476: Part 24 expresses the fire resistance of ducts without the aid of dampers, in terms of stability, integrity and insulation.

Stability failure occurs when the suspension or fixing devices can no longer retain a duct in its intended position or when sections of the duct collapse. This requirement does not apply to the length of the duct exposed to internal fire (Duct Type B) within the fire compartment.

It should be noted that if a duct suffers extensive deformation, such that it can no longer fulfil its intended purpose, this would be classed as stability failure. For Duct Type A, loss of pressure within the duct during testing is also construed as stability failure.

Integrity failure also occurs when cracks, holes or openings occur in the duct or at any penetrations within walls or floors, through which flames or hot gases can pass. The effects on integrity of the movement and distortion of both restrained and unrestrained ducts are also included in the standard.

Insulation failure occurs when the temperature rise on the outer surface of the duct outside the fire compartment exceeds 140°C (mean) or 180°C (maximum). The guidance in the standard also states that ducts lined with combustible materials or coated internally with fats or greases, e.g. kitchen extract, should also have this criterion for the inner surface of the duct within the fire compartment when the duct is exposed to external fire (Duct Type A).

For smoke extraction, the guidance in the standard states that the cross sectional area of a duct required to extract smoke in the event of a fire should not be reduced by more than 25% for the duration of the fire exposure. All PROMATECT®-H and PROMATECT®-S fire resistant ducts meet this requirement up to 240 minutes performance.

Design considerations

The following points are some of the factors which should be considered when determining the correct specification to ensure a ductwork system will provide the required fire performance.

Required fire exposure

Ductwork systems which are located in more than one compartment should always be tested or assessed for their performance when exposed to the heating conditions described within BS 476: Part 20: 1987. Reduced heating curves are generally only acceptable for certain of the systems components, e.g. fans.

The performance of a ductwork system will vary depending on whether or not a fire could have direct access to inside the duct through an unprotected opening. If in doubt, one should assume direct access, i.e. the prescribed Duct Type B scenario. The construction of all PROMATECT®-H and PROMATECT®-S fire resistant ducts detailed in this document fulfil both Duct Type A and B requirements.

Required fire performance

It is a general requirement that the ducts must satisfy all the relevant performance criteria of stability, integrity and insulation (and cross sectional area if a smoke extraction duct). However, the approval authority may accept exceptions on occasion. For example, if no combustible materials or personnel are likely to be in contact with the duct, the authority may accept a reduced insulation performance.

Supporting structure

Care should be taken that any structural element from which the duct system is supported, e.g. a beam, floor or wall, must have as a minimum the same fire resistance as the duct system itself and must be able to support the load of the duct under fire conditions.

Hanger support

The supporting steel hanger rods, channels and fixings should be appropriate for the load of the complete ductwork system including any applied insulation material or other services suspended from it.

For example, the length of the hanger support system should not exceed 2500mm unless appropriate insulation is provided to reduce the effect of thermal expansion. If the hanger supports are longer than 2500mm and unprotected, there is a likelihood that excessive expansion of the support system could place undue strain on the duct and lead to premature failure of the smoke extraction and ventilation system.

Steel ductwork

The steel duct must be constructed in accordance with the requirements of DW/144, "Specification for sheet metal ductwork: Low, medium and high pressure/velocity air systems (published by the Heating & Ventilating Contractors' Association UK)" or equivalent specification, e.g. SMACNA. The steel ducts must be constructed with rolled steel angle-flanged cross joints. It is recommended that longitudinal seams be formed using the Pittsburgh lock system.

Penetrations through walls and floors

Care should be taken to ensure that movement of the duct in ambient or in fire conditions does not adversely affect the performance of the wall, partition or floor, or any penetration seal. It should be understood that where a duct passes through any compartment wall or floor or other type of separating element, the aperture between the element and the duct must be sealed in accordance with the system approved for use with the specific duct system. In general this requires the use of a penetration seal constructed from materials and in such a manner to match the system used in the duct test programme. Penetration seals are part of the tested duct system and the use of untested third party products or systems are not permitted.

Movement joints

Movement joint details may be required for long lengths of duct, particularly where the duct spans across a movement joint in the floor or wall, or passes through floors and roof that may deflect at different rates. Please consult Promat for details of such joints.

Air flow and leakage

The design of some fire resisting duct systems may need modification to meet DW/144 performance standards.

Ductwork functions

Most ductwork systems can fall into one or more of the following categories:

- Ventilation and air conditioning
- Natural smoke extract
- Fan assisted smoke extract
- Pressurisation of escape routes and fire fighting lobbies

In the event of fire, the function of a system can often change. For example, an air conditioning system could switch to become a fan assisted smoke extract duct. It is therefore essential that the performance requirements in both normal conditions and fire conditions are considered.

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".

Selection of fire protection system

Traditionally all ductworks are fabricated from steel which normally had to be encased in a fire protection system when passing through a compartment wall or floor without the aid of a fire damper.

The stress allowance of the steel hanger rods for a 120 minute fire resistant duct should not exceed 10N/mm² and the centres of the hanger supports should not exceed 2500mm. These figures are based on work carried out by Warrington Fire Research Centre (now Exova Warrington) in the UK and European research projects into the stress and strains of steel members under simulated fire conditions.

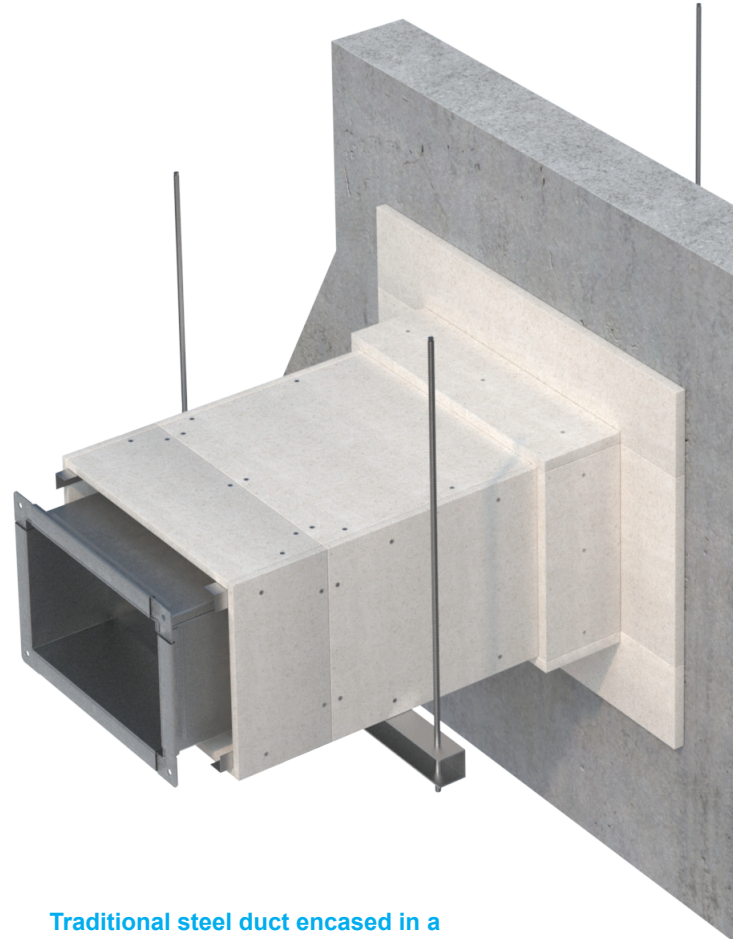
The stress reduction ratio factors below are based on BS EN 1993-1-2: 2005.

Fire resistance period	Approximate temperature	Maximum permitted stress	Maximum permitted centres
30 minutes	840°C	18N/mm ²	2500mm
60 minutes	950°C	10N/mm ²	2500mm
90 minutes	1000°C	10N/mm ²	2500mm
120 minutes	1050°C	10N/mm ²	2500mm
180 minutes	1110°C	6N/mm ²	2000mm
240 minutes	1150°C	6N/mm ²	1500mm

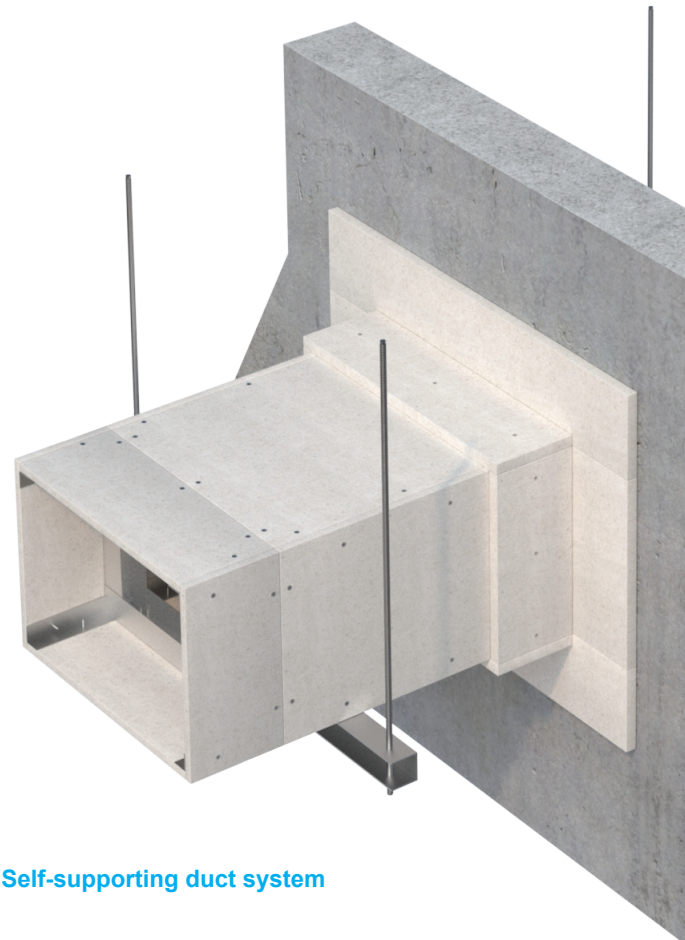
It should be noted that the stress levels referred to above apply to the threaded rod hanger supports themselves. The horizontal supporting members have a different level of applicable stress. The maximum centres refer to the greatest allowable distance between hanger support systems. However it should be noted that in certain locations, bends for instance, additional supports at lesser centres should be considered.

Where the hanger support system may exceed the limits given in the table above, the remedial options are as follows:

- 1) increase the dimensions of the hanger support system, e.g. rod diameters etc,
- 2) reduce the centres of the hanger support system, and
- 3) protect the hanger rods.



Traditional steel duct encased in a fire protection system



Self-supporting duct system

Stress calculation for hangers

To calculate the stress in N/mm² on each hanger, the total weight of the ductwork and fire protection materials being taken by each hanger should be calculated in kilograms, converted to Newtons (N) by multiplying 9.81 and then divided by the cross-sectional area of the hanger in mm². The cross-sectional area of a circular hanger is $\pi \times r^2$ where r is the radius of the support rod. It should be noted that the root diameter of the core of the threaded rod should be applied in this calculation, not the outer diameter of the threaded part of the rod.

The method to calculate whether the diameter of the threaded rod is within the permitted stress level is given below.

Nominal outer diameter	Root diameter	Cross sectional area
6mm	5.06mm	20.10mm ²
8mm	6.83mm	36.63mm ²
10mm	8.60mm	58.08mm ²
12mm	10.36mm	84.29mm ²
14mm	12.25mm	117.85mm ²
16mm	14.14mm	157.03mm ²
18mm	15.90mm	198.55mm ²
20mm	17.67mm	245.20mm ²

The density of steel is approximately 7850kg/m³, therefore the weight of steel (kg) = 7850kg/m³ x Surface area (m²) x Steel thickness (m).

The following example of calculating the stress of the support system is based on the use of PROMATECT®-H boards.

Board thickness = 12mm
 Duct height = 1.0m
 Duct width = 1.0m
 Section length = 1.22m
 Area of boards = (Width x 2) + (Height x 2) x Section length
 Weight of boards = Area x Thickness x Density (975kg/m³)
 Weight of angles = (Centres of hangers x 4) + (Width x 4) + (Height x 4) x 0.63kg/m
 Section weight = 68.62kg inclusive of angles
 Weight on one hanger = 34.31kg
 Total force = 336.58N (weight, kg x 9.81 = N)
 Diameter of steel rod = 8mm
 Cross section area = 36.63mm²
 Stress = $\frac{F}{A}$ where F = force in Newtons
 A where A = area of rod cross section
 = 9.19N/mm²

Since the stress is less than 10N/mm² (as set in the table here), an 8mm diameter rod is the minimum permissible for the duct of cross section 1000mm x 1000mm x 1220mm length constructed with a single layer of 12mm PROMATECT®-H for up to 120/120/120 fire resistance. If cladding a steel duct, the weight of this has to be included within the total weight supported upon the hangers.

If these stress levels are exceeded then the size of the hanger members must be increased, or the centres of the hangers reduced or the hangers protected. The penetration of the hanger fixings into any concrete soffit should be a minimum of 40mm for up to 120 minutes of fire resistance or 60mm for more than 120 minutes yet up to 240 minutes of fire resistance.

To calculate the stress of the horizontal supporting angle of channel, the following example of calculation would apply:

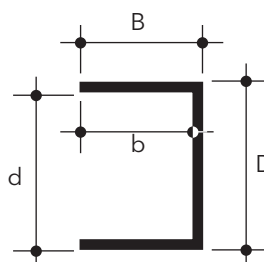
Board thickness = 12mm
 Duct height = 1.0m
 Duct width = 1.0m
 Section length = 1.22m
 Area of boards = (Width x 2) + (Height x 2) x Section length
 Weight of boards = Area x Thickness x Density (975kg/m³)
 Weight of angles = (Section length x 4) + (Width x 4) + (Height x 4) x 0.63kg/m
 Section weight = 68.62kg inclusive of angles
 Total force = 673N (Weight, kg x 9.81 = N)
 Maximum bending moment, M (Nm) = $\frac{w \times l}{8} = 102.63$

Steel loss of strength at 800°C based on strength reduction factor for steel complying with BS5950:

275N/mm² x 0.071 = 19.5N/mm²
 Allowance stress, S (N/mm²) > $\frac{M}{Z}$ where Z is the section modulus in cm³
 Section modulus, Z > $\frac{M}{19.5} > 5.26\text{cm}^3$

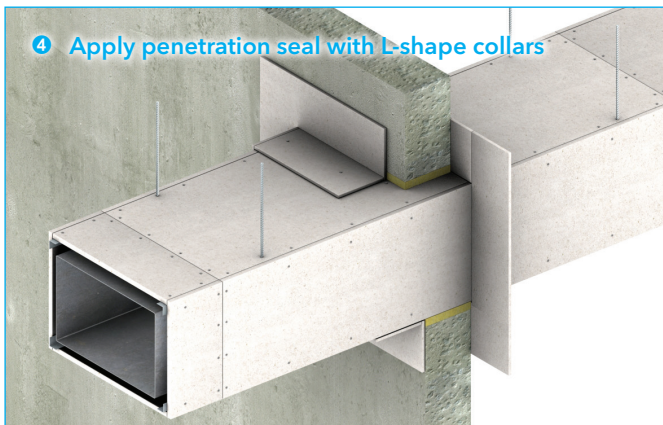
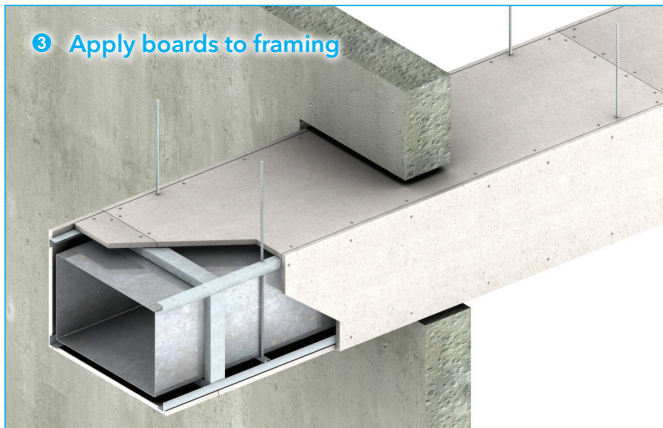
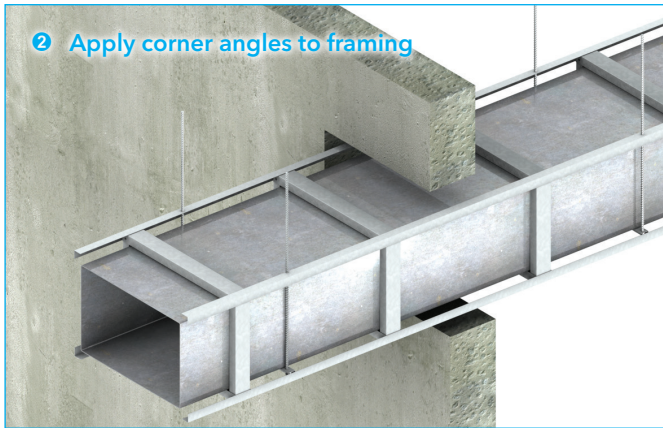
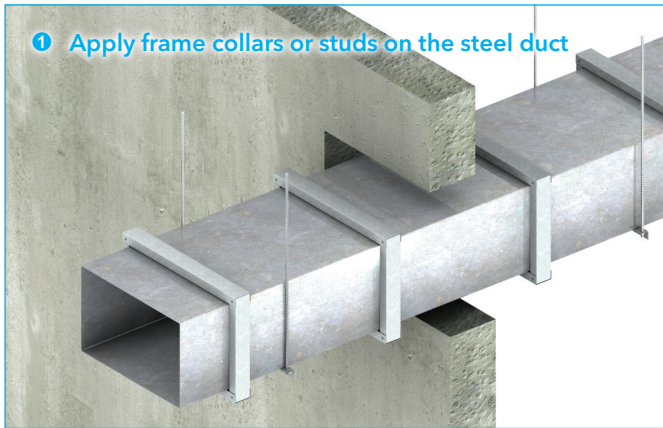
Using C-channels, with the dimensions as follows, a greater section modulus than 5.26cm³ is achieved thus is deemed suitable to be used in this case:

Breath of channel = 3cm
 Depth of channel = 7.5cm
 Thickness of channel = 0.5cm
 Section modulus, Z = $\frac{B \times D^2}{6} - \frac{b \times d^2}{6} = 5.83\text{cm}^3$

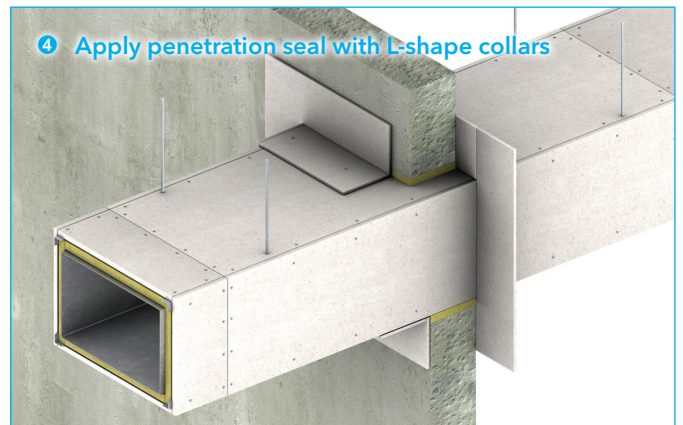
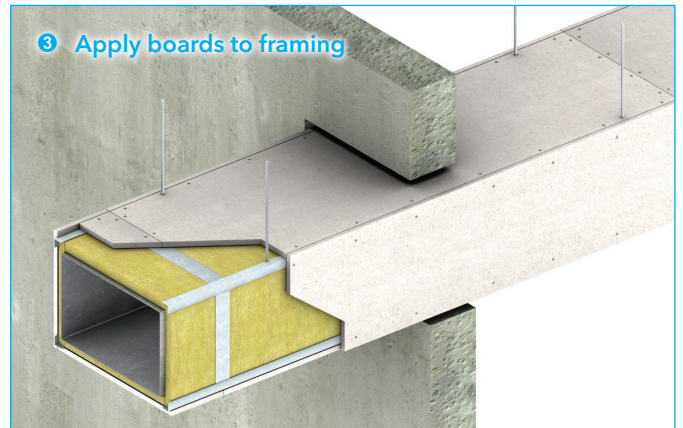
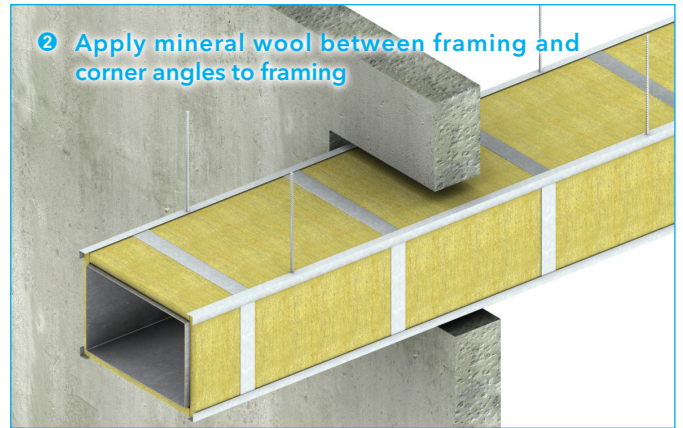
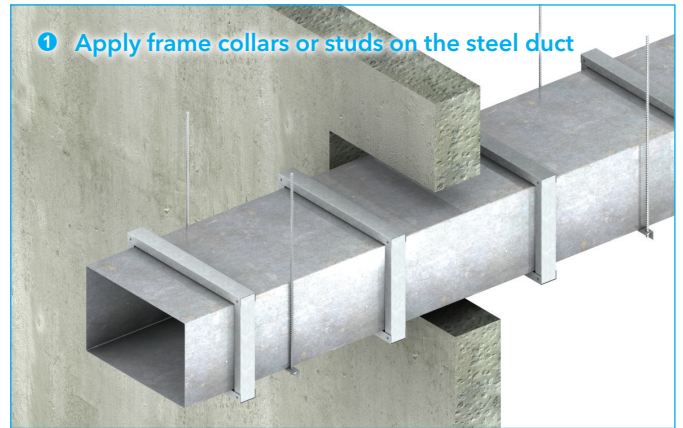


Typical installation examples of cladding to steel ducts

Integrity only



Integrity and insulation



There are multiple options available when joining galvanised steel ducts to PROMATECT®-H ductwork sections. These include the use of flexible connections, especially when connecting the duct system to vibrating elements of machinery, e.g. fans. The flexible material should be held in place with flat bar steel strips of not less than 2mm thickness attached with suitable fixings.

Where a proprietary brand of lightweight material is used, consideration should be given to the size of connection and how it is fitted. The more heavy weight type of flexible material may also be employed, formed into a channel section with corners fitted and stitched to give a neat airtight joint. Please consult Promat for details of the approved systems.

Sometimes it is necessary to connect a duct to a circular steel duct section or a circular fan connector. To do so, the rectangular cross-section of the duct must be fabricated larger than the diameter of the circular section to be connected. The end of rectangular duct is then blanked off with a section of PROMATECT®-H board with a circular hole the diameter of the circular duct or section to be joined.

If there is a requirement for services to be installed with the ductwork enclosure, care must be taken to ensure that the installed services do not compromise the fire integrity or insulation property of the ductwork. This can be achieved by using non combustible material, and where the services penetrate the ductwork, appropriate fire stopping measures are taken combustible plastics pipes and high risk power cables should not be installed within the ductwork enclosures.

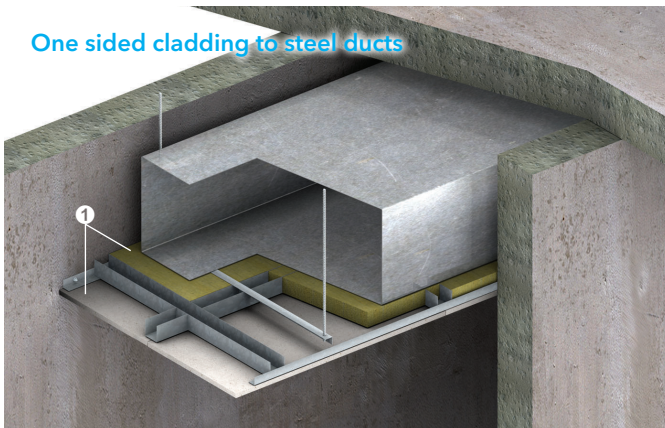
At wall penetrations, the gaps between the duct and the reveals of the opening must be filled with mineral wool, of minimum density 100kg/m³ and an L-shaped collar formed from the PROMATECT®-H boards around the duct on both sides of the wall. The minimum size of the collar is 150mm x 150mm and it is screwed to the duct cladding boards and bolted to the wall.

Minimum dimension of collars at penetrations seals will vary and is determined by fire resistance level and duct size. In general, collars should be constructed from boards of the same type and thickness as used for the duct. The minimum width of the collar can vary between 80mm to 150mm. Please consult Promat for details. Alternatively use a minimum width of 150mm horizontal and vertical collar.

Fire resistant ducts can be formed where the substrate from which the steel duct is supported provides protection to some areas, thus one, two and three sided solutions in combination with walls and ceilings are available. See below and the opposite page for the difference of using PROMATECT®-H boards and cover strips for the required fire resistance performance.

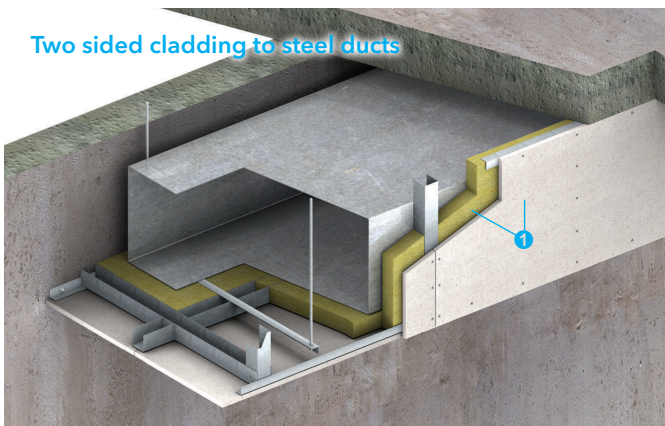
The construction of fire resistant encasements around single bay steel ducts is up to 1500mm wide using PROMATECT®-H boards in accordance with the criteria of BS 476: Part 24: 1987, all exposed to external and internal fire. However, this ductwork system is approved for ducts up to 10000mm wide using the PROMATECT®-H boards.

One sided cladding to steel ducts

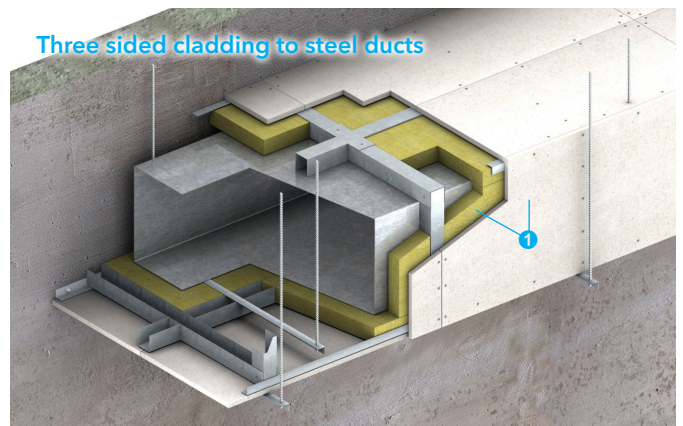


1. One layer of PROMATECT®-H board, thickness and mineral wool requirements as specified on following pages.

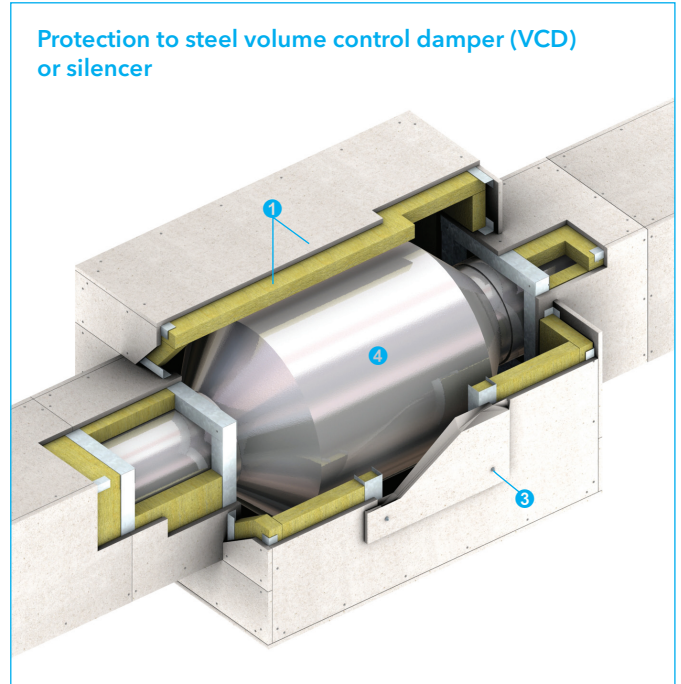
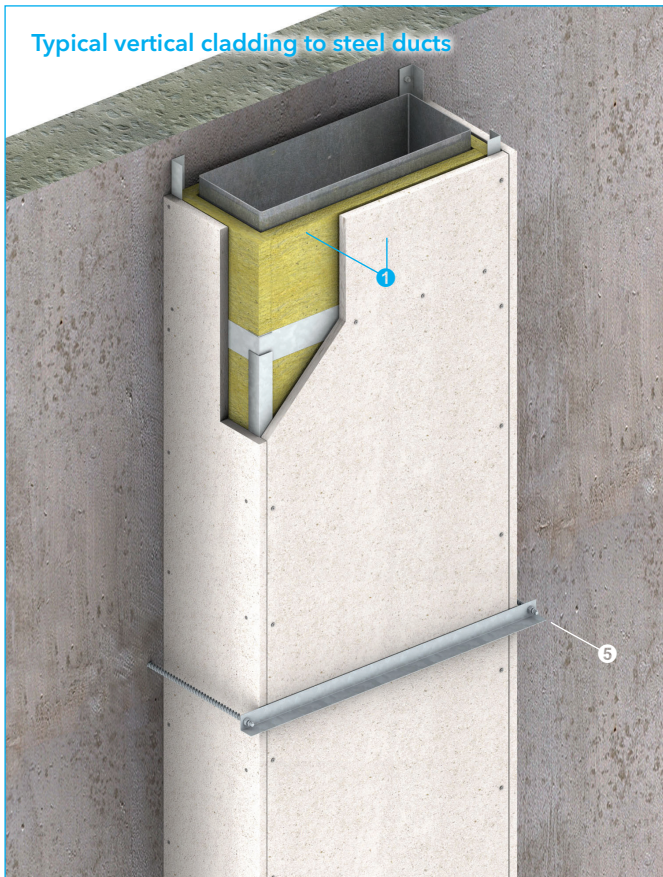
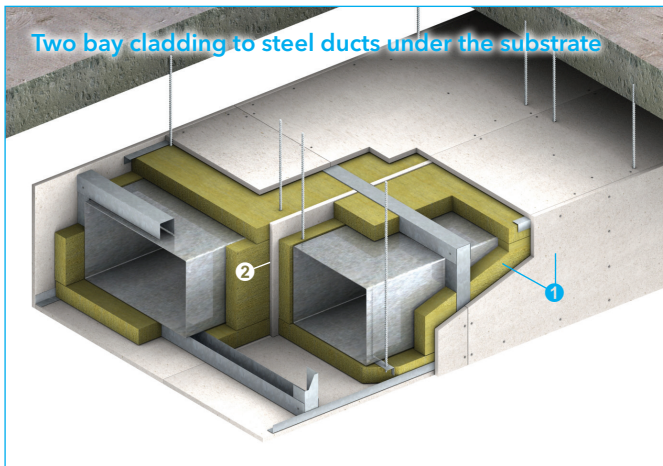
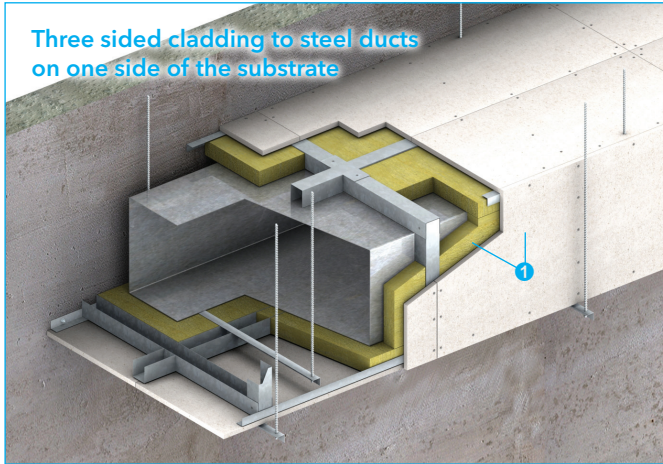
Two sided cladding to steel ducts



Three sided cladding to steel ducts



Typical installation examples of cladding to steel ducts




1. One layer of PROMATECT®-H board, thickness and mineral wool requirements as specified on following pages.
2. Dividing board similar to type 1 fixed to framework using self-tapping screws at 200mm centres.
3. M6 anchor bolts at nominal 250mm centres.
4. Steel VCD (please consult Promat for the protection construction details).
5. Support hanger requirements (please consult Promat for test report).

CLADDING TO STEEL DUCTS

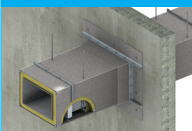
PROMATECT®-H cladding to steel duct

Type	Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.	Page no.
	A and B	120/120/120	PH.41.12	15mm	50mm x 100kg/m ³ or 2 x 25mm x 100kg/m ³	7500mm x 2500mm	WF 346620 Issue 2	11
	A and B	120/120/120	PH.41.12	15mm	1 x 50mm x 100kg/m ³ or 2 x 25mm x 100kg/m ³	6000mm x 2500mm	WF 406598 Issue 2	12
	A and B	240/240/240	PH.41.24	25mm	2 x 50mm x 100kg/m ³	6000mm x 2500mm	WF 406598 Issue 2	13
	A and B	120/120/-	PH.41.12.E	9mm	Not required	3000mm x 1150mm	WF 168555 Issue 3	14
	A and B	240/240/-	PH.41.24.E	12mm	Not required			

PROMATECT®-H cladding to steel duct for windowless bathroom

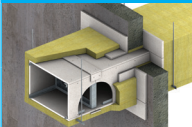
Type	Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.	Page no.
	A and B	120/120/30	PH.41.12	15mm	Not required	200mm x 200mm	WF 433052	15 & 16

PROMATECT®-S cladding to steel duct


Type	Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.	Page no.
	A and B	240/240/240	PS.41.24	9.5mm	100mm x 160kg/m ³	3000mm x 1500mm	BRE cc 281350 Review 1 Issue 1	17

SELF-SUPPORTING DUCTS

PROMATECT®-H self-supporting duct

Type	Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.	Page no.
	A and B	120/120/120	PH.43.12	25mm	1 x 50mm x 140kg/m ³	10000mm x 3000mm	WF 426598 Issue 3	18
	A and B	240/240/240	PH.43.24	25mm	2 x 50mm x 140kg/m ³			

PROMATECT®-S self-supporting duct

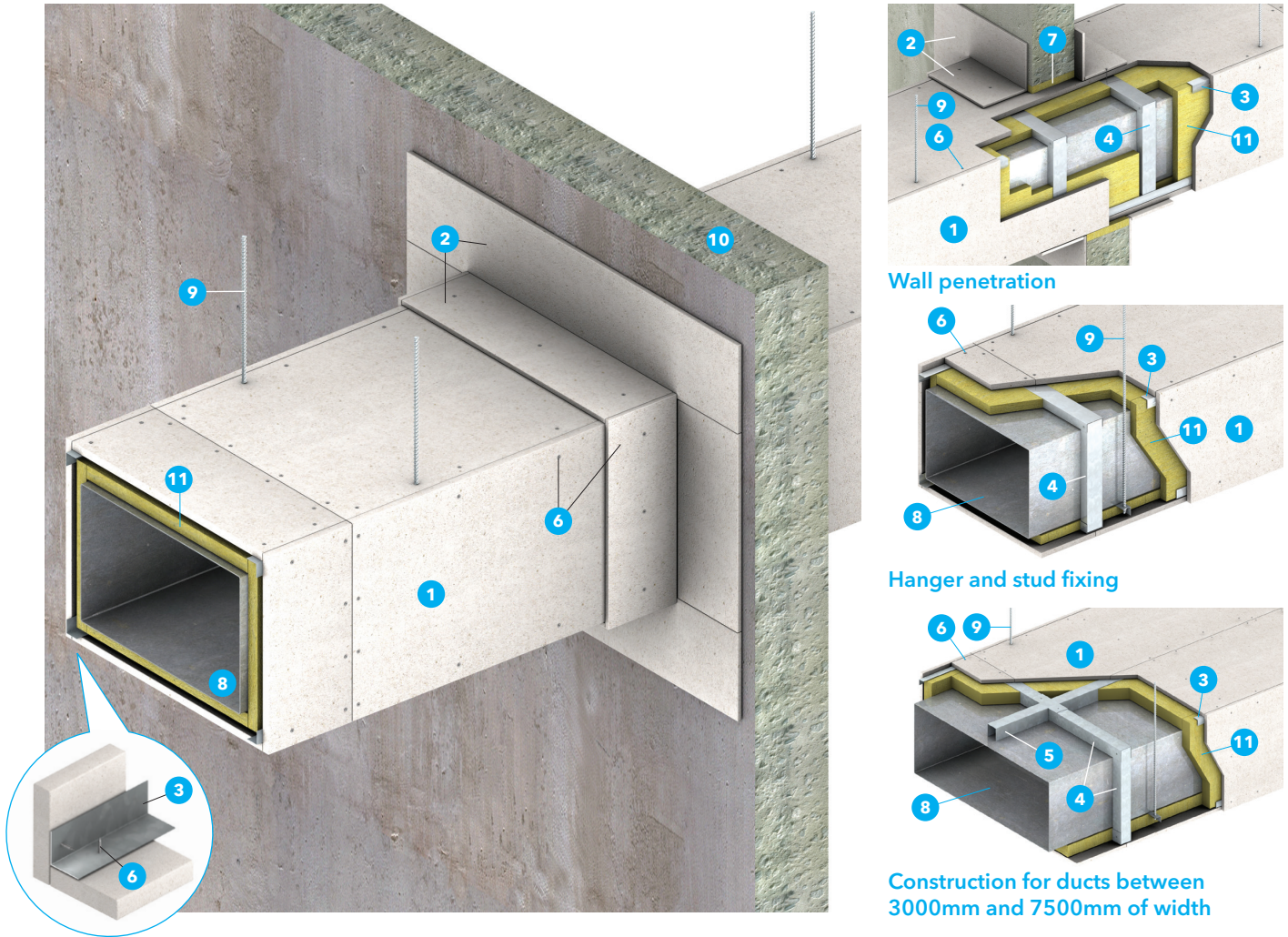
Type	Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.	Page no.
	A and B	120/120/-	PS.43.12.E	6mm	Not required	1000mm x 250mm	BRE cc 89275 Review 7 Issue 1	19
	A and B	240/240/30	PS.43.24	9.5mm	Not required			

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.

PROMATECT®-H – 2-hour fire rated cladding to steel duct (type 1)

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/120	PH.41.12	15mm	1 x 50mm x 100kg/m ³ or 2 x 25mm x 100kg/m ³	7500mm x 2500mm	WF 346620 Issue 2

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.

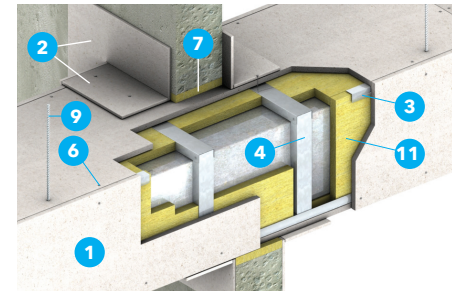
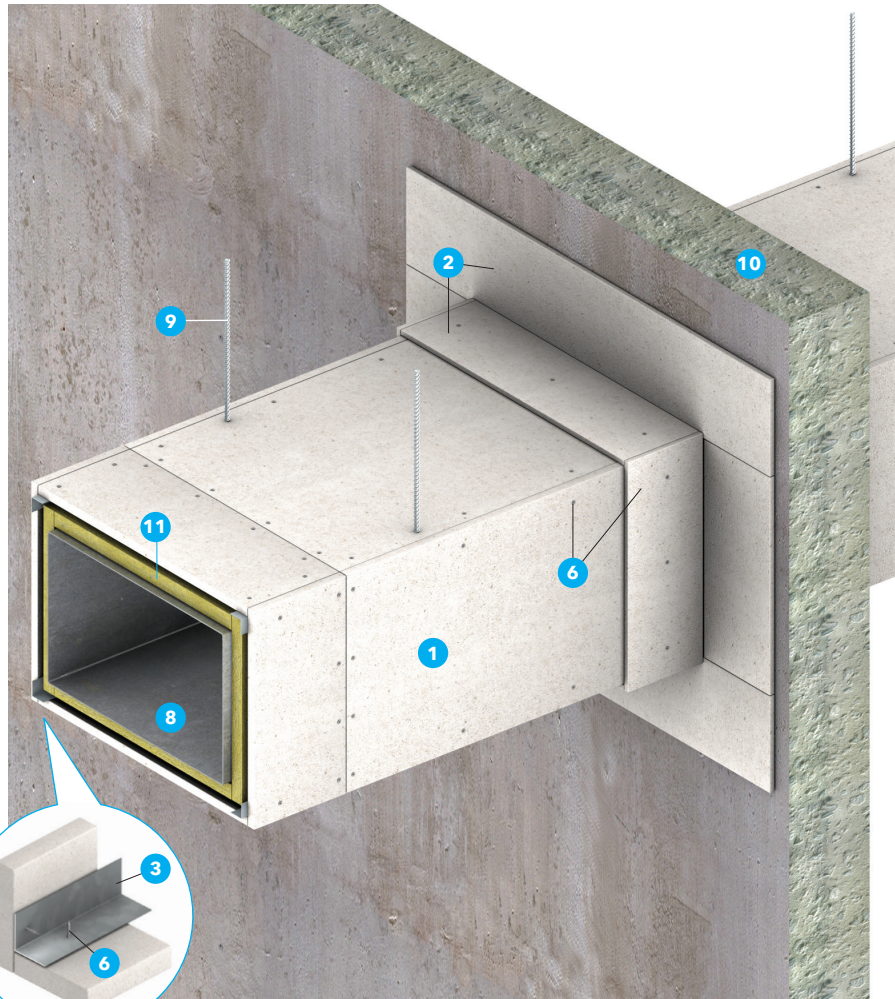


1. One layer of PROMATECT®-H board, thickness refer to above table.
2. 100mm wide PROMATECT®-H collars, thickness in accordance with above table, fitted around the duct on both sides of the wall forming an L shape.
3. Min. 50mm x 50mm x 1mm thick steel angle at corner joints.
4. Min. 50mm x 50mm x 1mm thick steel channel collar frame (all round) at nominal 610mm centres.
5. Min. 50mm x 50mm x 1mm thick steel channel at cross joints.
6. No. 8 or M4 self-tapping screws at nominal 200mm centres.
7. Mineral wool pack minimum 100kg/m³.
8. Min. 0.7mm thick galvanised steel sheet (as per recommendation).
9. Steel duct hanger max. stress 10N/mm² at nominal 1220mm centres.
10. Concrete or masonry wall.
11. Mineral wool, thickness refer to above table.

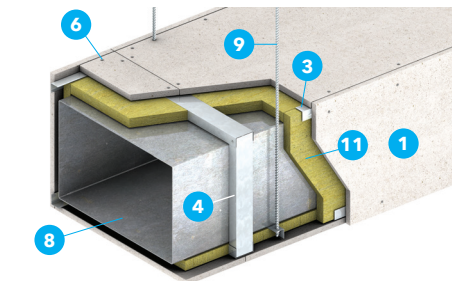
PROMATECT®-H – 2-hour fire rated cladding to steel duct (type 2)

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/120	PH.41.12	15mm	1 x 50mm x 100kg/m ³ or 2 x 25mm x 100kg/m ³	6000mm x 2500mm	WF 406598 Issue 2

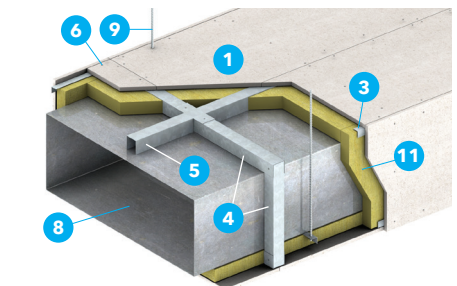
*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.



Wall penetration



Hanger and stud fixing



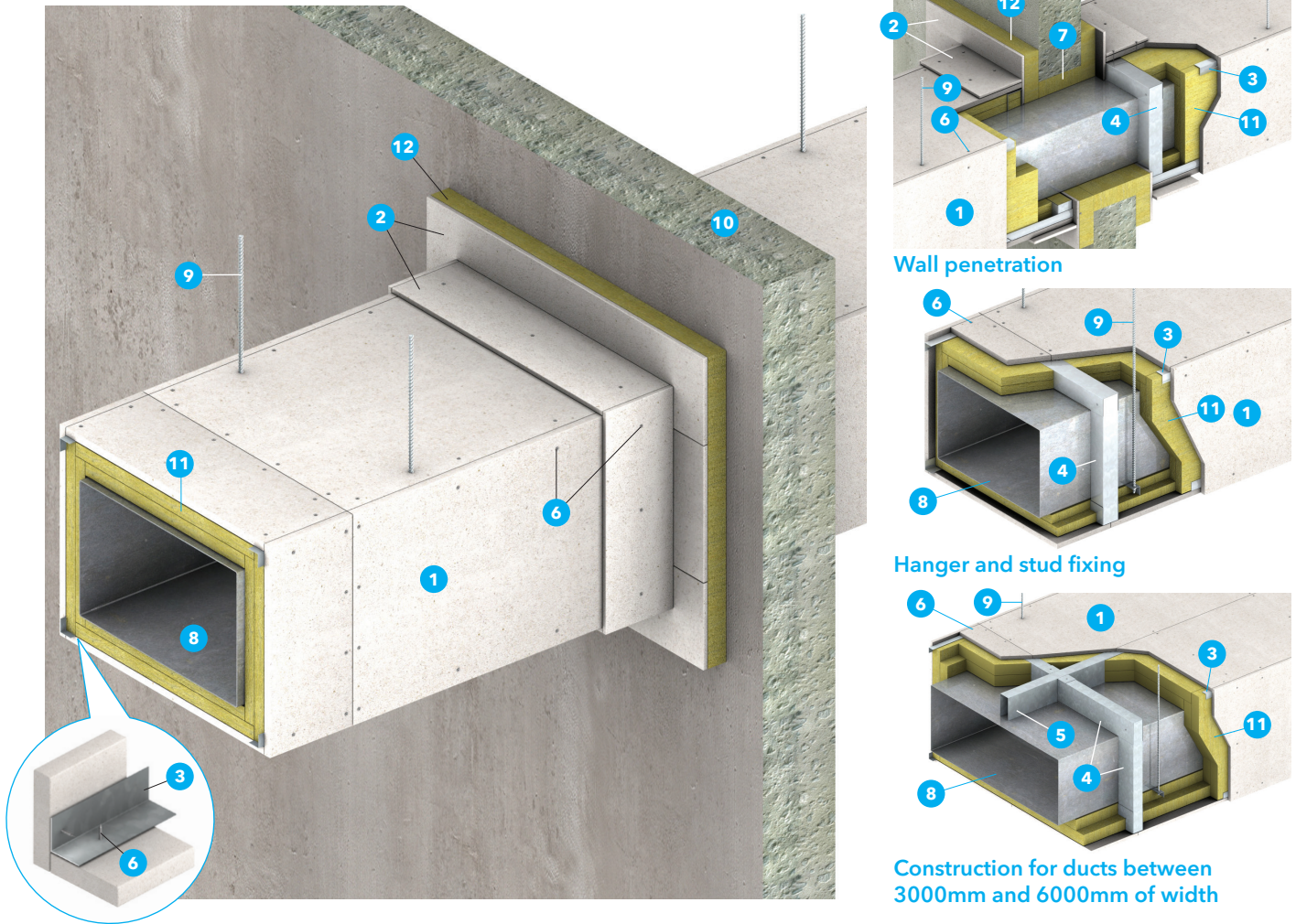
Construction for ducts between 3000mm and 6000mm of width

1. One layer of PROMATECT®-H board, thickness refer to above table.
2. 100mm wide PROMATECT®-H collars, thickness in accordance with above table, fitted around the duct on both sides of the wall forming an L shape.
3. Min. 50mm x 50mm x 1mm thick steel angle at corner joints.
4. Min. 50 x 50 x 1mm thick steel channel collar frame (all round) at nominal 610mm centres.
5. Min. 50 x 50 x 1mm thick steel channel at cross joints.
6. No. 8 or M4 self-tapping screws at nominal 200mm centres.
7. 100 kg/m³ Mineral wool pack for penetration seal up.
8. Min. 0.6mm thick galvanised steel sheet (as per recommendation).
9. Max. stress 10N/mm² steel duct hanger at nominal 1220mm centres.
10. Concrete or masonry wall.
11. Mineral wool, thickness refer to above table.

PROMATECT®-H – 4-hour fire rated cladding to steel duct

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	240/240/240	PH.41.24	25mm	2 x 50mm x 100kg/m ³	6000mm x 2500mm	WF 406598 Issue 2

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.

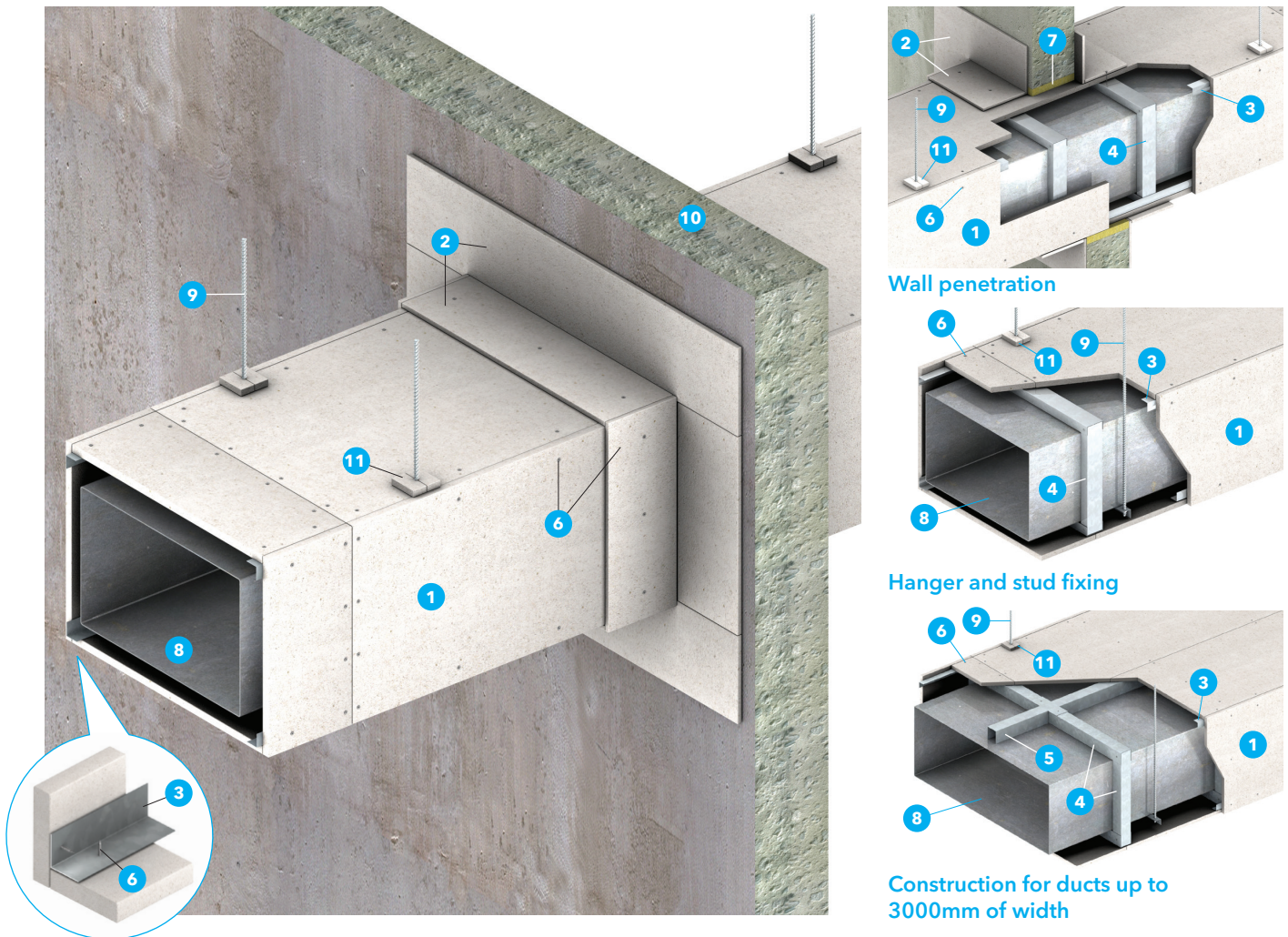


1. One layer of PROMATECT®-H board, thickness refer to above table.
2. 100mm wide PROMATECT®-H collars, thickness in accordance with above table, fitted around the duct on both sides of the wall forming an L shape.
3. Min. 50mm x 50mm x 1mm thick steel angle at corner joints.
4. Min. 100 x 50 x 1mm thick steel channel collar frame (all round) at nominal 610mm centres.
5. Min. 100 x 50 x 1mm thick steel channel at cross joints.
6. No. 8 or M4 self-tapping screws at nominal 200mm centres.
7. 100 kg/m³ Mineral wool pack for penetration seal up.
8. Min. 0.6mm thick galvanised steel sheet (as per recommendation).
9. Max. stress 6N/mm² steel duct hanger at nominal 1220mm centres.
10. Concrete or masonry wall.
11. Mineral wool, thickness refer to above table.
12. Mineral wool, 50mm x 100kg/m³.

PROMATECT®-H – 2 & 4-hour fire rated cladding to steel duct (Integrity only)

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/-	PH.41.12.E	9mm	Not required	3000mm x 1150mm	WF 168555 Issue 3
A and B	240/240/-	PH.41.24.E	12mm			

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.

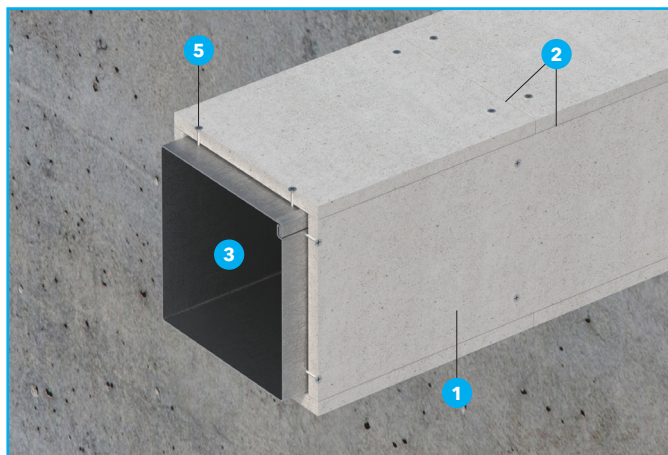
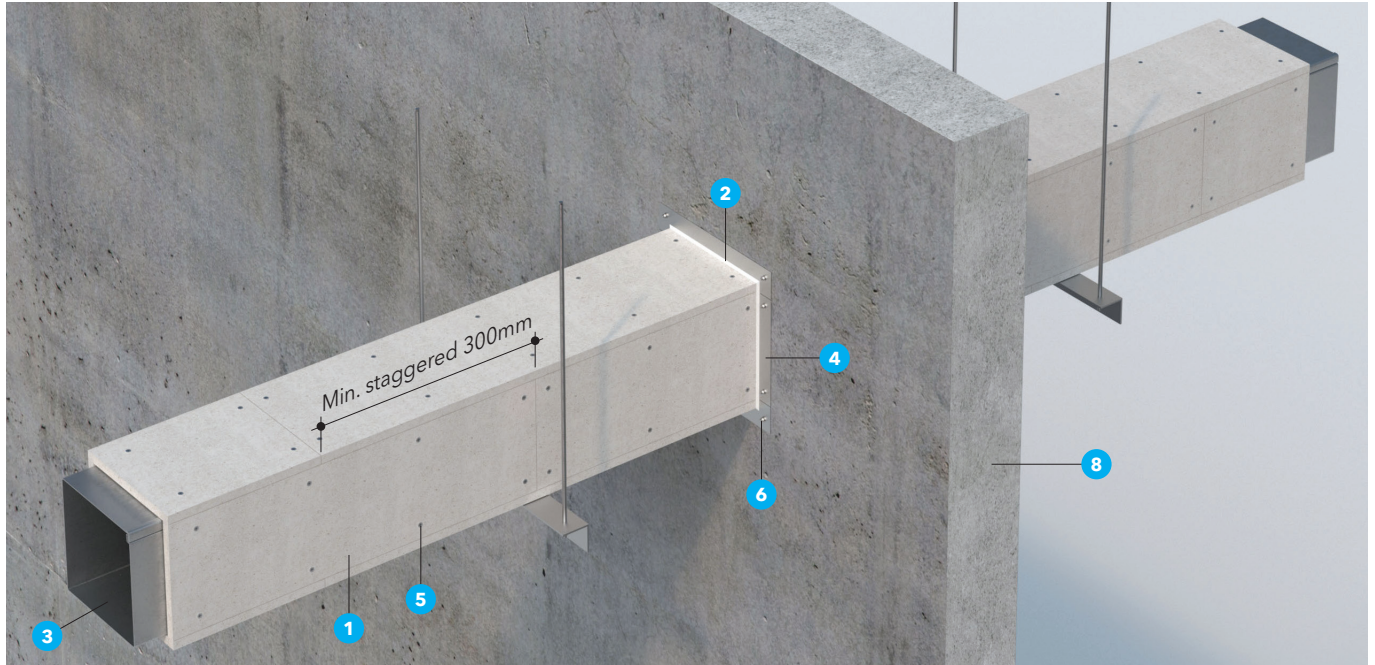


1. One layer of PROMATECT®-H board, thickness refer to above table.
2. 150mm wide PROMATECT®-H collars, thickness in accordance with above table, fitted around the duct on both sides of the wall forming an L shape.
3. Min. 25mm x 25mm x 0.6mm thick steel angle at corner joints.
4. 50mm x 50mm x 0.8mm thick steel channel collar frame (all round) at nominal 1220mm centres.
5. Min. 25mm x 25mm x 0.6mm thick steel channel at cross joints.
6. M4 self-tapping screws at nominal 200mm centres.
7. Mineral wool pack minimum 100kg/m³.
8. Min. 0.8mm thick galvanised steel sheet (as per recommendation).
9. Steel duct hanger at nominal 1220mm centres.
2 hours: max. stress 10N/mm²
4 hours: max. stress 6N/mm²
10. Concrete or masonry wall.
11. 75mm x 75mm PROMATECT®-H collars, thickness in accordance with above table.
Seal gaps with PROMASEAL® Intumescent Acrylic Sealant.

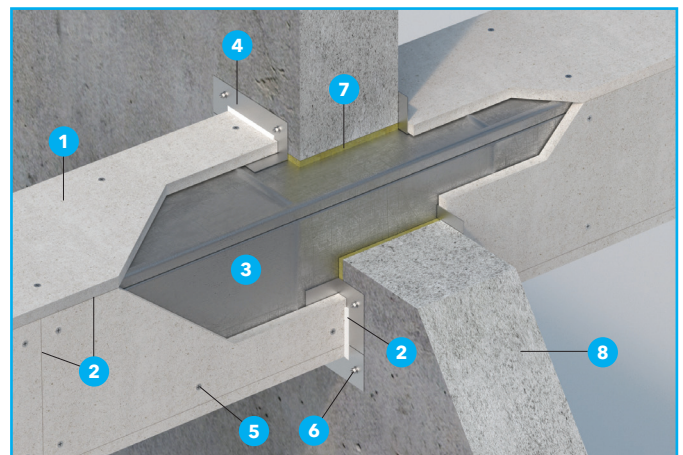
PROMATECT®-H – 2-hour fire rated cladding to steel duct for windowless bathroom (type 1)

Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/30	PH.41.12	15mm	Not required	200mm x 200mm	WF 433052

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.



Board fixing



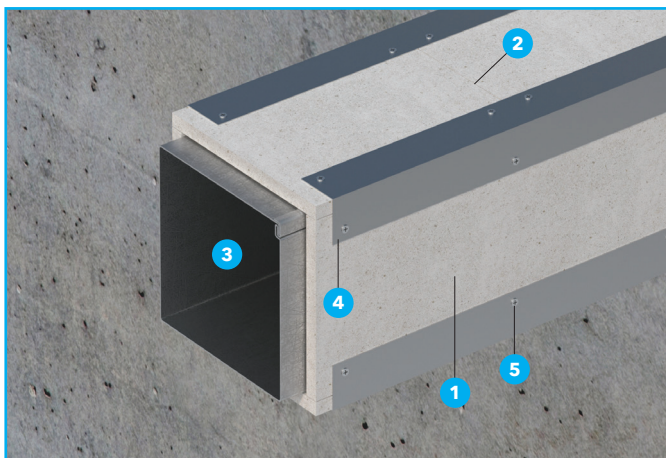
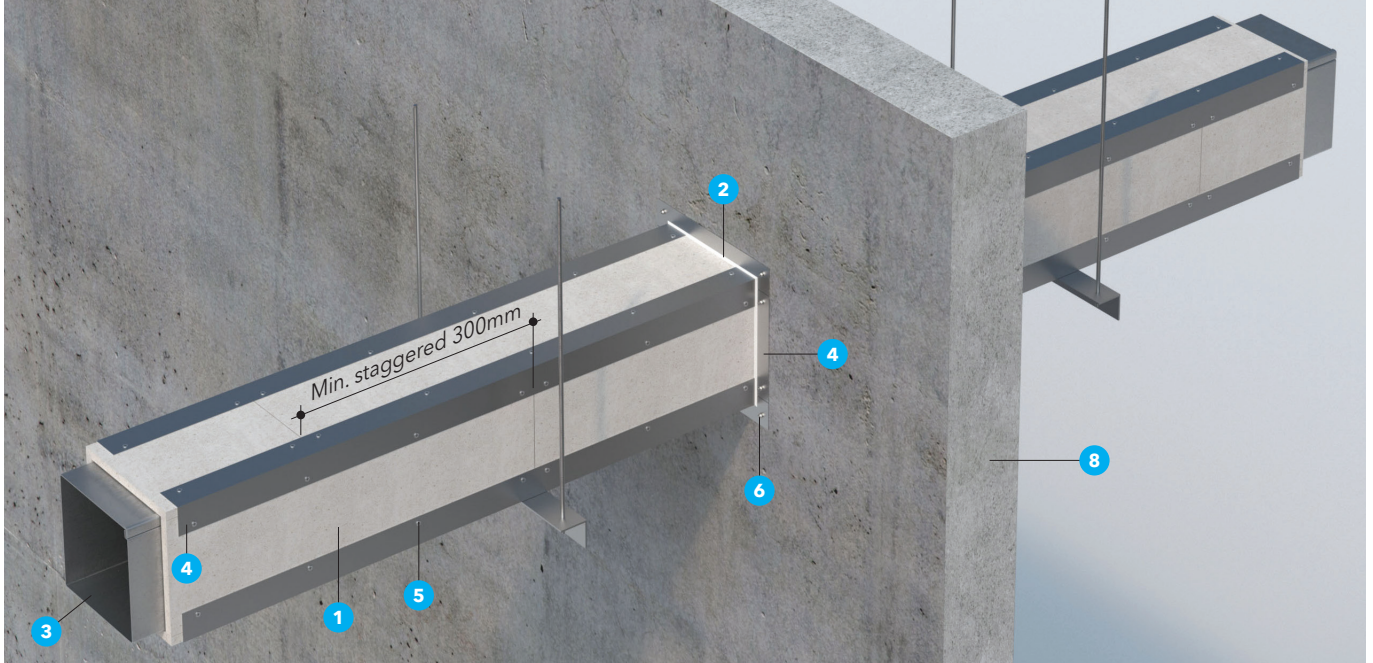
Wall penetration

1. One layer of PROMATECT®-H board 15mm thick.
2. Gap sealed with PROMASEAL® Intumescent Acrylic Sealant.
3. Sheet metal duct 200 x 200mm.
4. Galvanised steel L-angles 50 x 50 x 0.8mm thick.
5. M4 self-tapping screws at nominal 200mm centres.
6. M6 masonry anchor bolts with washer.
7. Mineral wool infill min. 100kg/m³.
8. Concrete wall.

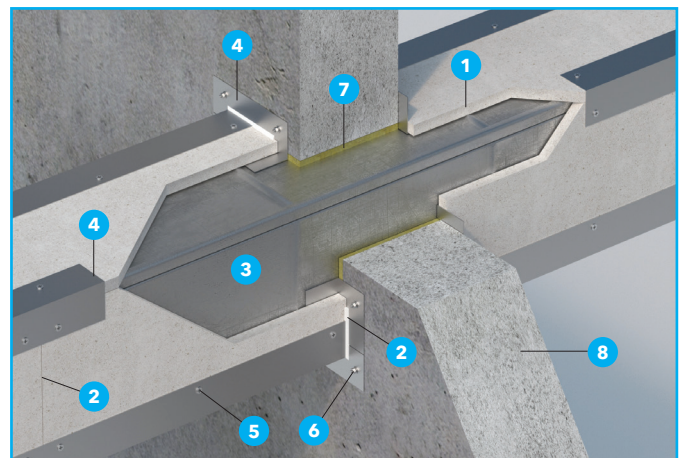
PROMATECT®-H – 2-hour fire rated cladding to steel duct for windowless bathroom (type 2)

Duct type	FRR	Model number	Board thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/30	PH.41.12	15mm	Not required	200mm x 200mm	WF 433052

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.



Board fixing



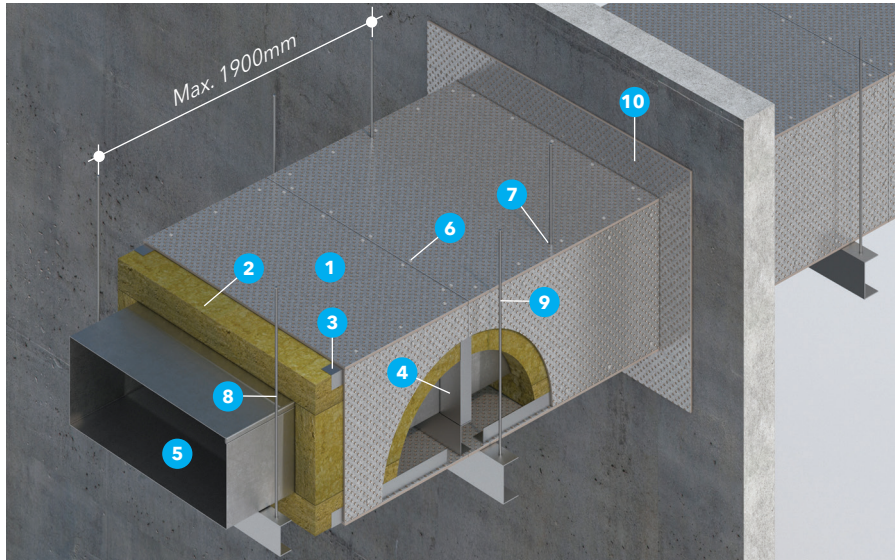
Wall penetration

1. One layer of PROMATECT®-H board 15mm thick.
2. Gap sealed with PROMASEAL® Intumescent Acrylic Sealant.
3. Sheet metal duct 200 x 200mm.
4. Galvanised steel L-angles 50 x 50 x 0.8mm thick.
5. M4 self-tapping screws at nominal 200mm centres.
6. M6 masonry anchor bolts with washer.
7. Mineral wool infill min. 100kg/m³.
8. Concrete wall.

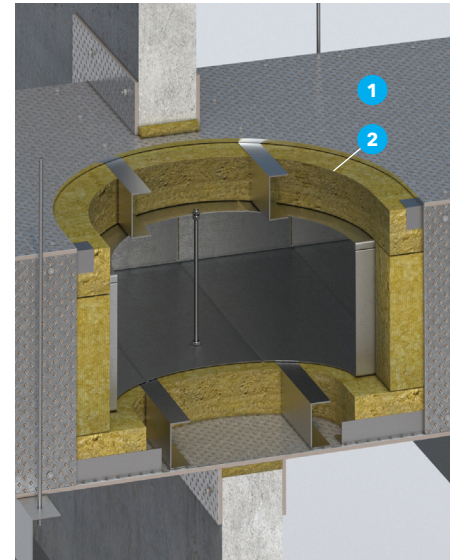
PROMATECT®-S – 4-hour fire rated cladding to steel duct

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	240/240/240	PS.41.24	9.5mm	100mm x 160kg/m ³	3000mm x 1500mm	BRE cc 281350 Review 1 Issue 1

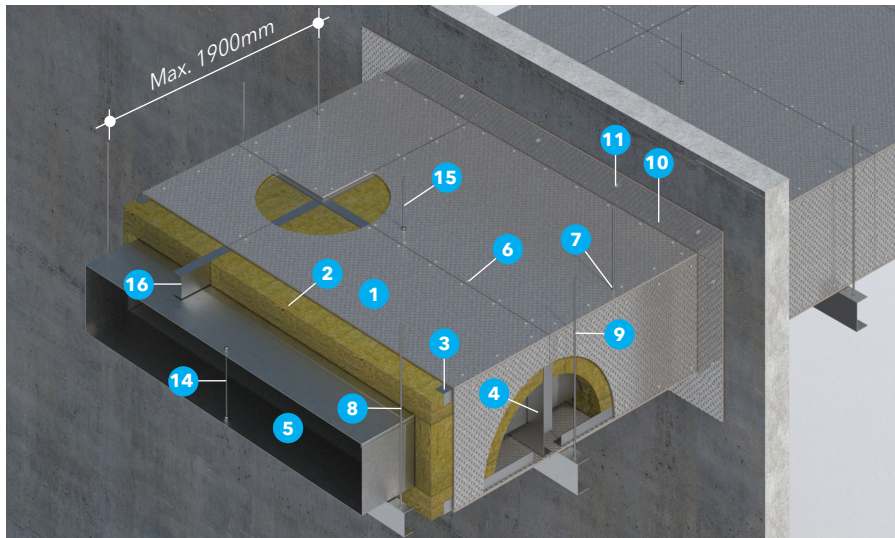
*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.



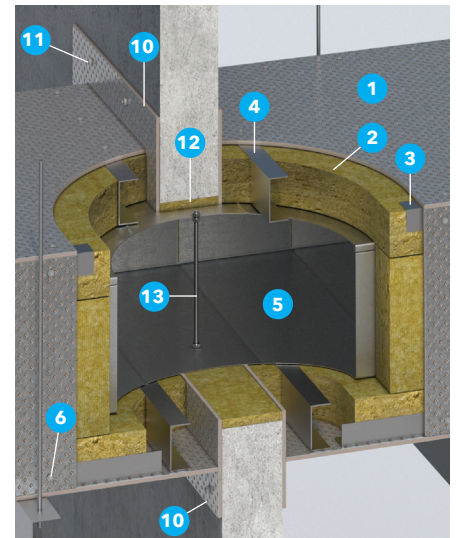
Construction for ducts up to 1500mm of width



Wall penetration (Option 1)



Construction for ducts up to 3000mm of width



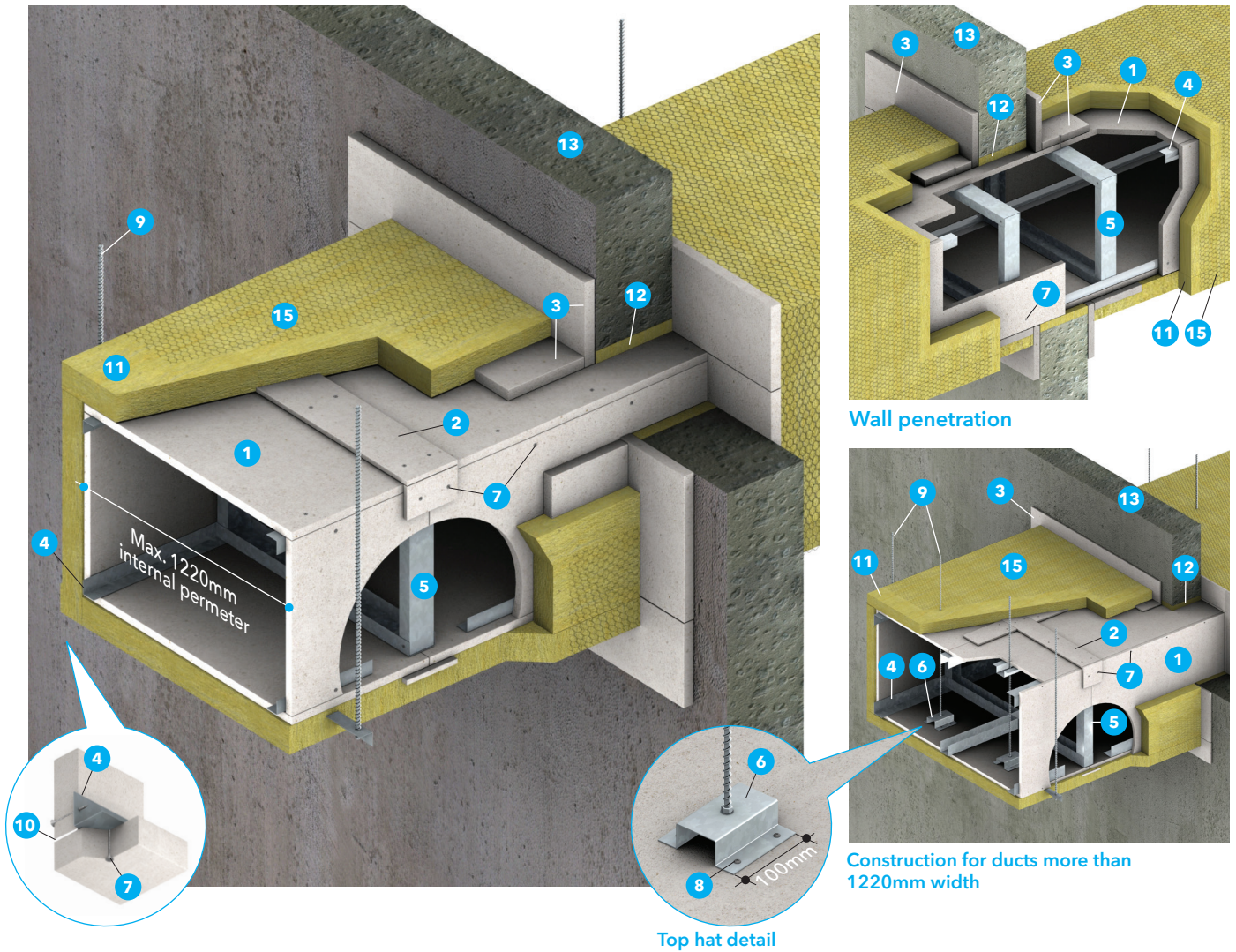
Wall penetration (Option 2)

1. One layer of PROMATECT®-S board, thickness refer to above table.
2. Mineral wool, thickness refer to above table.
3. 50mm x 50mm x 3mm thick steel angle at corner joints.
4. 50 x 100 x 3mm cold rolled channel welded together at corners to form a collar frame at max. 2500mm interval
5. Galvanised steel duct.
6. Teks screws at nominal 200mm centres.
7. Gap sealed with PROMASEAL® Intumescent Acrylic Sealant.
8. Steel duct hanger max. stress 6N/mm² at nominal 1900mm centres.
9. Additional steel duct hanger max. stress 6N/mm² at nominal 1900mm centres to support PROMATECT®-S construction.
10. PROMATECT®-H collars, thickness in accordance with above table.
11. Expansion bolts at nominal 500mm centres fixing cover plate to wall.
12. Min. 140 kg/m³ Mineral wool pack for penetration seal up.
13. For internal duct width above 1500mm. Ø 15mm steel rods, welded/fastened in approx. mid-width at wall penetrations.
14. For internal duct width above 1500mm. Ø 15mm steel rods, welded/fastened in approx. mid-width at each flanged duct joint.
15. For internal duct width above 1500mm. Additional hanger max. stress 6N/mm² to support PROMATECT®-S construction.
16. 50 x 100 x 50 x 3mm thick cold rolled channel to coincide with longitudinal board joints.

PROMATECT®-H – 2 & 4-hour fire rated self-supporting duct

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/120	PH.43.12	25mm	1 x 50mm x 140kg/m ³	10000mm x 3000mm	WF 426595 Issue 3
A and B	240/240/240	PH.43.24	25mm	2 x 50mm x 140kg/m ³		

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.

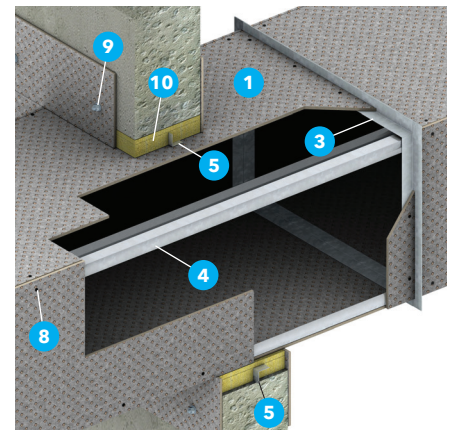
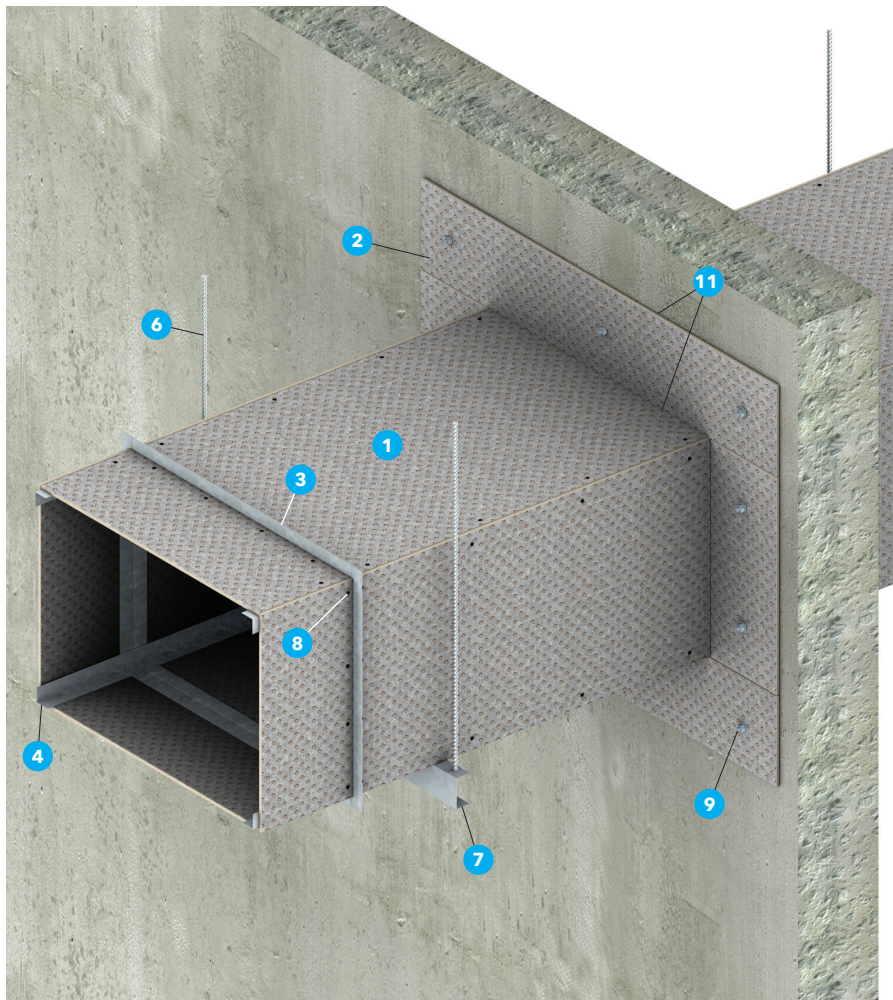


1. One layer of PROMATECT®-H board, thickness refer to above table.
2. PROMATECT®-H cover strip 100mm wide x 9mm thick.
3. 150mm wide PROMATECT®-H collars x 25mm thick, fitted around the duct on both sides of the wall forming an L shape.
4. Min. 30mm x 30mm x 1mm thick galvanised steel angle at corner joints.
5. 50 x 30 x 1.2mm thick steel channel collar frame (all round) at nominal 1220mm centres.
6. 50 x 30 x 25 x 1.2mm thick x 100mm long galvanised steel top hat section at nominal 1220mm centres.
7. M4 or No. 6 x 45mm long self-tapping screws at nominal 200mm centres.
8. M4 Phillips round-pan head self-tapping screws.
9. Steel duct hanger at nominal 1220mm centres.
2 hours: max. stress 10N/mm²
4 hours: max. stress 6N/mm²
10. All gap sealed with PROMASEAL® Intumescent Acrylic Sealant.
11. Mineral wool, thickness refer to above table.
12. Min. 100 kg/m³ mineral wool pack for penetration seal up.
13. Concrete or masonry wall.
14. Steel rivet.
15. Steel chicken wire mesh with 0.5mm bore wrapped around the insulation and fastened to itself with stainless steel wire.

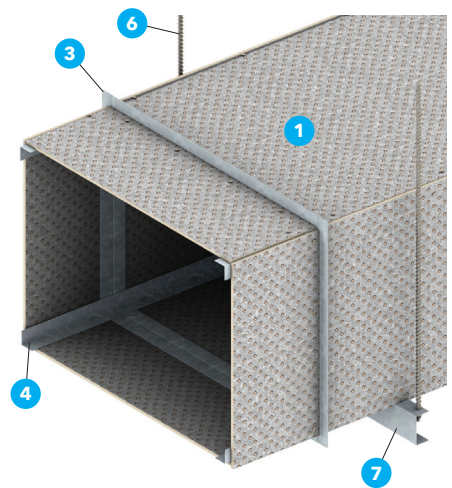
PROMATECT®-S – 2 & 4-hour fire rated self-supporting duct

Duct type	FRR	Model number	Board / Collar thickness	Mineral wool thickness x density	Maximum size	*Test assessment report no.
A and B	120/120/-	PS.43.12E	6mm	Not required	1000mm x 250mm	BRE cc 89275 Review 7 Issue 1
A and B	240/240/30	PS.43.24	9.5mm			

*All tested according to BS 476: Part 24: 1987 for internal and external fire (duct types A and B). For other requirements, please consult Promat.



Wall penetration



Hanger and stud fixing

1. One layer of 9.5mm thick PROMATECT®-S board.
 2. 100mm wide x 9.5mm thick PROMATECT®-S collars, fitted around the duct on both sides of the wall.
 3. Continuous steel flange sections, fabricated by cut and welded back to back 50mm x 50mm x 3mm thick galvanised steel angles bolted together with M10 bolts and nuts at nominal 500mm centres.
 4. 50mm x 50mm x 3mm thick galvanised steel angles for corner reinforcement purposes (no mechanical fixing required).
 5. 50mm x 50mm x 3mm galvanised steel angles, fixed to the top section of the duct and positioned in the wall thickness within the penetration to act as a stiffener.
 6. Threaded steel rod hangers of 15mm diameter, the stress of the threaded steel rods must not exceed 10N/mm² for fire ratings up to two hours and 6N/mm² for fire ratings up to four hours.
 7. Galvanised steel channel or angle (see 6 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers).
 8. M5.5 Tek screws minimum 35mm long at 200mm centres.
 9. M6 anchor bolts at nominal 500mm centres.
 10. Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct.
 11. Caulk all board joints with PROMASEAL® Intumescent Acrylic Sealant to achieve the required fire resistance performance.
- This self-supporting duct system is approved for the specified sizes in above table. For larger ducts, please consult Promat for variations on the supporting components.

Promat

Australia

Promat Australia Pty Ltd

South Australia office

1 Scotland Road
SA 5031 Mile End South
☎ 1800 Promat (776 628)
☎ +61 8 8352 1014
✉ PAPT.mail@etexgroup.com

New South Wales office

Unit 1, 175 Briens Road
Northmead, NSW 2152
☎ 1800 Promat (776 628)
☎ +61 2 9630 0258
✉ PAPT.mail@etexgroup.com

Victoria office

Unit 1, 355 Grieve Parade
Altona North, VIC 3025
☎ 1800 Promat (776 628)
☎ 1800 334 598
✉ PAPT.mail@etexgroup.com

Queensland office

80 Stradbroke St
Heathwood QLD 4110
☎ 1800 011 376
☎ 1800 334 598
✉ PAPT.mail@etexgroup.com

China

Promat Shanghai Ltd

No.2, Tai Hua Street
Yonghe Economic District
Guangzhou City
Guangdong Province 511356
☎ +86 20 8136 1167
✉ promat.cn@etexgroup.com

Hong Kong

Promat International (Asia Pacific) Ltd

Room 1010, C.C. Wu Building
302-308 Hennessy Road
Wanchai
☎ +852 2836 3692
✉ promat.hk@etexgroup.com

Malaysia

Etex Malaysia Sdn Bhd

(Formerly known as Promat (Malaysia) Sdn. Bhd.)
Unit 19-02-01, Level 2, Wisma Tune
19 Lorong Dungun, Damansara Heights
50490 Kuala Lumpur
☎ +60 3 2095 8555
✉ promat.my@etexgroup.com

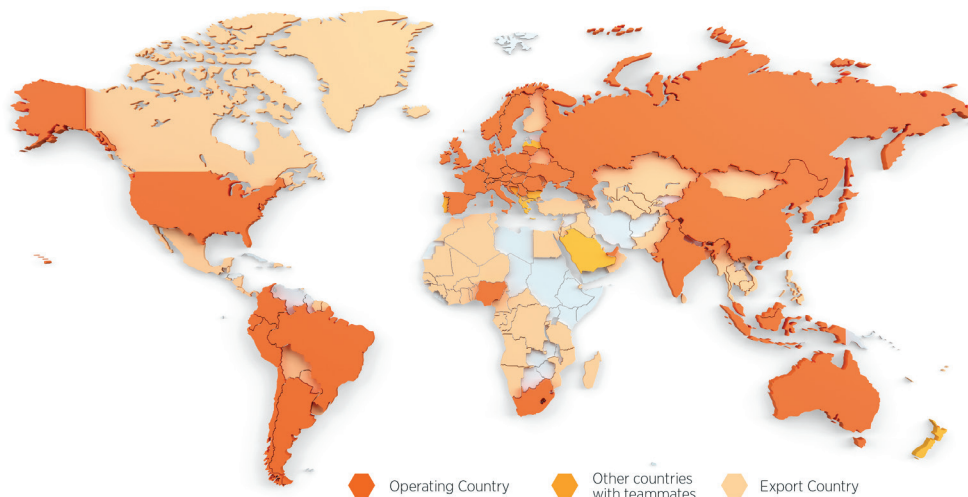
Singapore

Promat Building System Pte Ltd

10 Science Park Road, #03-14 The Alpha
Singapore Science Park II
117684 Singapore
☎ +65 6776 7635
✉ promat.sg@etexgroup.com

www.promat.com

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Etex fosters a collaborative and caring culture, a pioneering spirit and a passion to always do better for its customers. Building on its experience and global market needs, the company strives to improve its customers quality of living with ever more effective lightweight solutions.

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- Exteriors: Provider of innovative, durable, high performance and beautiful fibre cement exterior materials for architectural, residential and agricultural projects.
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