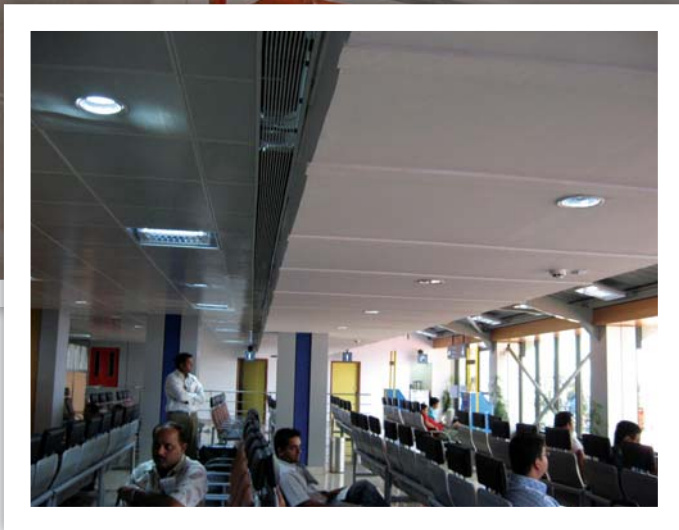


PASSIVE FIRE PROTECTION SYSTEMS **Application & Technical Manual:** **Ductwork**



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Steel duct claddings inside the Changi Water Reclamation Plant (above) and the boarding hall of Pune International Airport in Maharashtra, India (left). Both projects used PROMATECT®-H boards.

The relative complexity of any ductwork system passing through different fire compartments 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 document 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 for self-supporting systems using PROMATECT®-H, PROMATECT®-L500 and PROMATECT® 50 boards.

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

Fire Testing Methods

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: 1987, AS 1530: Part 4: 2005, BS EN 1366: Parts 1, 5 and 8.

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

Although the following information refers to BS 476: Parts 20 and 24, these details apply equally to AS 1530: Part 4 in terms of the performance requirements. It should be noted, however, that there are substantial differences between the two standards in terms of testing methodology which can greatly affect the results. It is not possible to simply transfer results from the AS 1530: Part 4 test to BS 476: Part 24 due to this large difference in testing methods.

As part of a standard fire test, 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 (the EN and revised ISO standards required a 4000mm length exposed) 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.

Continued on next page

Fire Testing Methods Continued from previous page

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, PROMATECT®-L500, PROMATECT®-S and PROMATECT® 50 fire resistant ducts meet this requirement for in excess of 120 minutes and, for most these duct systems, up to 240 minutes.

General 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.

1 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. the fan.

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, PROMATECT®-L500, PROMATECT®-S and PROMATECT® 50 fire resistant ducts detailed in this document fulfil both Duct Type A and B requirements.

2 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.

3 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.

4 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.

5 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 and 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.

6 Penetrations Through Walls & 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. Penetrations seals are part of the tested duct system and the use of untested third party products or systems are not permitted.

7 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.

8 Air Flow & Leakage

The design of some fire resisting duct systems may need modification to meet DW/144 performance standards. All Promat self-supporting duct systems will meet the requirements of DW/144 to the highest levels, provided the correct board thickness is employed and all joints are correctly sealed in accordance with the system recommendations.

9 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.

10 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.

In recent years, self-supporting duct systems without a steel liner have been introduced to extract smoke in the event of a fire through natural ventilation. Some can match the leakage and air flow performance of steel ducts in accordance with the DW/144 standard up to Class C.

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. Similar figures can be applied from AS/NZS 4600: 2005/ Amendment 1: 2010.

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 members have a differing 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.

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.

$$\begin{aligned}
 \text{Board thickness (mm)} &= 12 \\
 \text{Duct height (m)} &= 1.0 \\
 \text{Duct width (m)} &= 1.0 \\
 \text{Section length (m)} &= 1.22 \\
 \text{Area of boards} &= (\text{Width} \times 2) + (\text{Height} \times 2) \times \text{Section length} \\
 \text{Weight of boards} &= \text{Area} \times \text{Thickness} \times \text{Density} (975\text{kg/m}^3) \\
 \text{Weight of angles} &= (\text{Centres of hangers} \times 4) + (\text{Width} \times 4) + (\text{Height} \times 4) \times 0.63\text{kg/m} \\
 \text{Section weight (kg)} &= 68.62 \text{ inclusive of angles} \\
 \text{Weight on one hanger (kg)} &= 34.31 \\
 \text{Total force (N)} &= 336.58 (\text{Weight, kg} \times 9.81 = \text{N}) \\
 \text{Diameter of steel rod (mm)} &= 8 \\
 \text{Cross section area (mm}^2) &= 36.63 \\
 \text{Stress (N/mm}^2) &= \frac{F}{A} \text{ where } F = \text{force in Newtons} \\
 &= \frac{336.58}{36.63} = 9.19\text{N/mm}^2
 \end{aligned}$$

Since the stress is less than 10N/mm² as set in the bottom left table, 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:

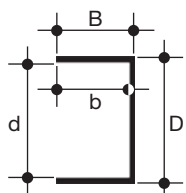
$$\begin{aligned}
 \text{Board thickness (mm)} &= 12 \\
 \text{Duct height (m)} &= 1.0 \\
 \text{Duct width (m)} &= 1.0 \\
 \text{Section length (m)} &= 1.22 \\
 \text{Area of boards} &= (\text{Width} \times 2) + (\text{Height} \times 2) \times \text{Section length} \\
 \text{Weight of boards} &= \text{Area} \times \text{Thickness} \times \text{Density} (975\text{kg/m}^3) \\
 \text{Weight of angles} &= (\text{Section length} \times 4) + (\text{Width} \times 4) + (\text{Height} \times 4) \times 0.63\text{kg/m} \\
 \text{Section weight (kg)} &= 68.62 \text{ inclusive of angles} \\
 \text{Total force (N)} &= 673 (\text{Weight, kg} \times 9.81 = \text{N}) \\
 \text{Maximum bending moment, M (Nm)} &= \frac{w \times L}{8} = 102.63
 \end{aligned}$$

Steel loss of strength at 800°C based on strength reduction factor for steel complying with Grade 43 to 50 of BS 4360:

$$\begin{aligned}
 275\text{N/mm}^2 \times 0.071 &= 19.5\text{N/mm}^2 \\
 \text{Allowance stress, S (N/mm}^2) &> \frac{M}{Z} \text{ where } Z \text{ is the section modulus in cm}^3 \\
 \text{Section modulus, Z} &> \frac{M}{19.5} \\
 &> 5.26\text{cm}^3
 \end{aligned}$$

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:

$$\begin{aligned}
 \text{Breath of channel (cm)} &= 3 \\
 \text{Depth of channel (cm)} &= 5 \\
 \text{Thickness of channel (cm)} &= 0.5 \\
 \text{Section modulus, Z} &= \frac{B \times D^2}{6} - \frac{b \times d^2}{6} = 5.83\text{cm}^3
 \end{aligned}$$





Type	Fire resistance performance	Board thickness	Duct type	Mineral wool thickness x density	Maximum duct size	Test/Approval no.	Page no.	
 <p>PROMATECT®-H cladding to steel ducts</p>	120/120/-	9mm	A and B	Not required	6000mm x 2500mm	BRE CC82101, BRE CC89273, BRE CC89769, BRE CC93731 and WF 178825 to the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005	7-12	
	120/120/30	15mm	A and B	Not required				
	120/120/60	9mm	9mm	A and B				50mm x 80kg/m ³
				A				25mm x 80kg/m ³
		12mm	12mm	A				25mm x 60kg/m ³
				B				2 x 25mm x 60kg/m ³
	120/120/120	9mm	9mm	A and B				100mm x 100kg/m ³
				A and B				80mm x 100kg/m ³
		12mm	12mm	A				2 x 25mm x 100kg/m ³
				B				3 x 25mm x 100kg/m ³
	15mm	15mm	A and B	50mm x 100kg/m ³				
			A	30mm x 100kg/m ³				
	B	2 x 25mm x 100kg/m ³						
	240/240/-	12mm	A and B	Not required				
	240/240/30	12mm	12mm	A and B				50mm x 60kg/m ³
A and B				Not required				
A and B				Not required				
240/240/60	12mm	A and B	50mm x 100kg/m ³					
240/240/120	12mm	12mm	A and B	80mm x 100kg/m ³				
			A and B	50mm x 100kg/m ³				
240/240/240	25mm	A and B	2 x 50mm x 100kg/m ³					
 <p>PROMATECT®-L500 cladding to steel ducts</p>	120/120/120	20mm	A and B	50mm x 100kg/m ³	6000mm x 3000mm	WFRC C80100, WFRC C80103, BRE CC274804, BRE CC84487 and BRE CC86921 to the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005	13-16	
		50mm	A and B	Not required	6000mm x 1600mm			
		52mm	A and B	Not required	6000mm x 1600mm			
240/240/240	50mm	A and B	75mm x 100kg/m ³	6000mm x 3000mm				
 <p>PROMATECT® 50 cladding to steel ducts</p>	120/120/120	15mm	A and B	50mm x 100kg/m ³	6000mm x 1500mm	BRANZ FAR 3530 to the requirements of BS 476: Part 24: 1987	17, 18	
 <p>PROMATECT®-S cladding to steel ducts</p>	120/120/30	6mm	B	Not required	10000mm x 1500mm	BRE CC87038, BRE CC89276 and BRE CC94711B to the requirements of BS 476: Part 24: 1987	21, 22	
	120/120/120	6mm	A and B	50mm x 140kg/m ³	3000mm x 1500mm			
	240/240/30	9.5mm	B	Not required	10000mm x 1500mm			
	240/240/60	9.5mm	A	Not required	10000mm x 1500mm			
	240/240/240	9.5mm	A and B	100mm x 160kg/m ³	3000mm x 1500mm			

For ducts exposed to external fire (Duct Type A), the insulation can be measured inside the duct, inside the fire compartment or outside the duct on an adjacent compartment. The insulation performance in the above insulated systems is measured outside the duct on an adjacent compartment. Please consult Promat for the insulation performance required inside the duct or inside the fire compartment.



Type	Fire resistance performance	Board thickness	Duct type	Mineral wool thickness x density	Maximum duct size	Test/Approval no.	Page no.	
 PROMATECT®-H self-supporting duct systems	120/120/-	12mm	A and B	Not required	10000mm x 3000mm	BRE CC82043D, BRE CC82101, BRE CC88388, WFRC C134133 and WFRC C81218 to the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005	23-25	
	120/120/120	15mm	A and B	100mm x 140kg/m ³	6100mm x 3000mm			
	180/180/90	20mm	A	Not required	10000mm x 3000mm			
	240/240/30	20mm	B	Not required	10000mm x 3000mm			
		25mm	A and B	Not required	8000mm x 2000mm			
240/240/240	25mm	A and B	100mm x 140kg/m ³	6100mm x 3000mm				
 PROMATECT®-L500 self-supporting duct systems	30/30/30	25mm	A and B	Not required	3000mm x 1250mm (see page 19 for details of duct size and maximum operating pressure)	BRE CC83903, BRE CC84890, BRE CC86825 and WFRC C80557 to the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005	26, 27	
		40mm	A and B	Not required				
	60/60/30	25mm	A and B	Not required				
		60/60/60	25mm	A				Not required
			35mm	B				Not required
	90/90/90	40mm	A and B	Not required				
		25mm	A	Not required				
		40mm	B	Not required				
	120/120/120	25mm	A	Not required				
		40mm	A	Not required				
		52mm	B	Not required				
	240/240/30	25mm	A and B	Not required				
		40mm	B	Not required				
	240/240/240	50mm	A	Not required				
52mm		B	50mm x 100kg/m ³					
 PROMATECT®-S self-supporting duct systems	120/120/-	6mm	A and B	Not required	10000mm x 4000mm	BRE CC84362, BRE CC87622, BRE CC89275, BRE CC92293, BRE CC92294 and LPC CC87844 to the requirements of BS 476: Part 24: 1987	28-33	
	120/120/60	2 x 6mm	B	Please consult Promat	3000mm x 1500mm			
	120/120/120	2 x 6mm	A and B	Please consult Promat	10000mm x 4000mm			
	180/180/120	6mm	B	Please consult Promat	3000mm x 1500mm			
	180/180/180	9.5mm	A and B	Please consult Promat	3000mm x 1500mm			
	240/240/-	9.5mm	A and B	Not required	10000mm x 4000mm			
	240/240/120	2 x 9.5mm	A and B	Please consult Promat	3000mm x 1500mm			
		9.5mm	B	Please consult Promat	3000mm x 1500mm			
	240/240/180	2 x 9.5mm	B	Please consult Promat	3000mm x 1500mm			
		9.5mm	A and B	Please consult Promat	3000mm x 1500mm			
240/240/240	9.5mm	A and B	Please consult Promat	3000mm x 1500mm				
360/360/-	6mm	A and B	Not required	1000mm x 250mm				

For ducts exposed to external fire (Duct Type A), the insulation can be measured inside the duct, inside the fire compartment or outside the duct on an adjacent compartment. The insulation performance in the above insulated systems is measured outside the duct on an adjacent compartment. Please consult Promat for the insulation performance required inside the duct or inside the fire compartment.

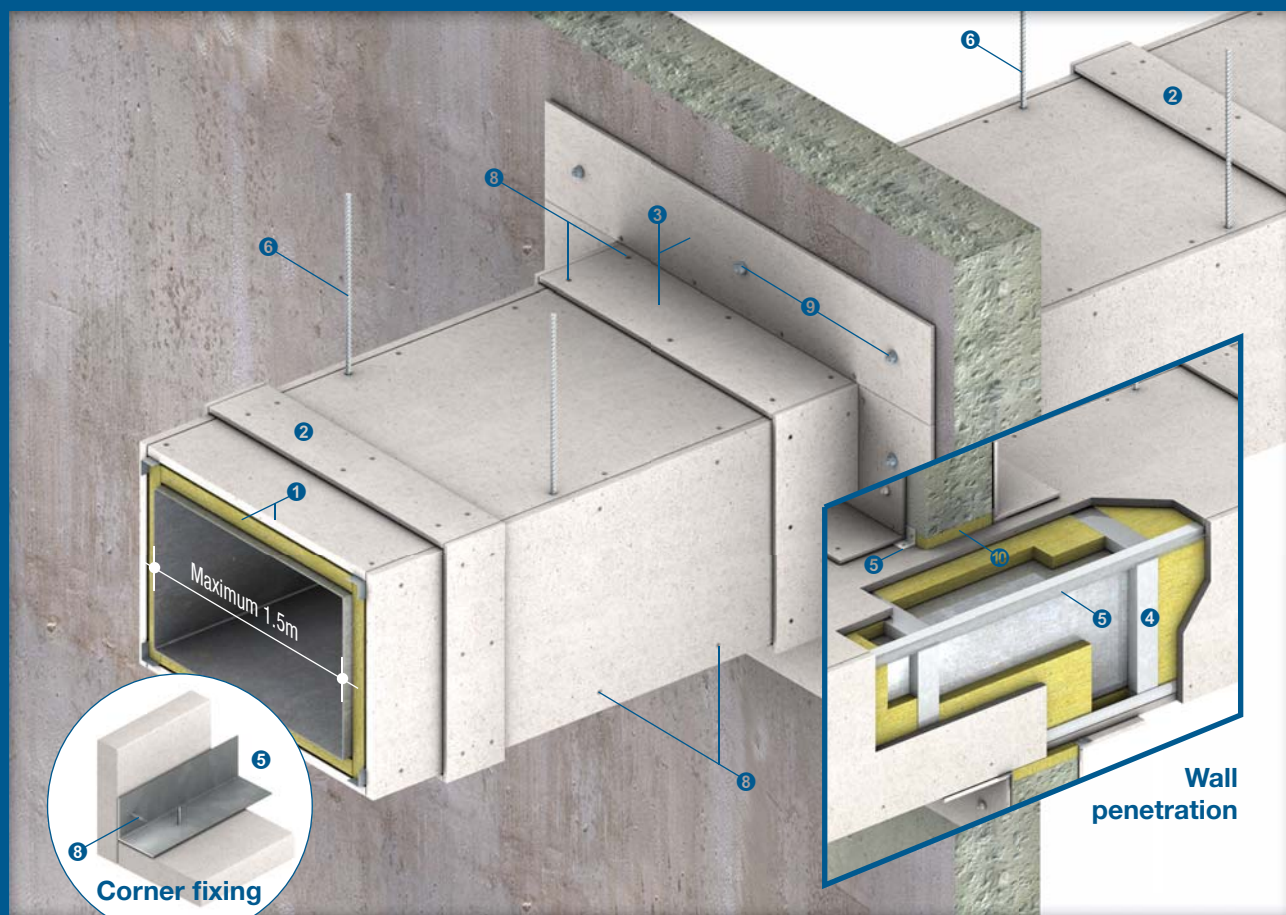


Integrity Only

- 1 Apply frame collars/studs on the steel duct
- 2 Apply corner angles to framing
- 3 Apply boards to framing
- 4 Apply penetration seal with L shape collars

Integrity & Insulation

- 1 Apply frame collars/studs on the steel duct
- 2 Apply mineral wool between framing and corner angles to framing
- 3 Apply boards to framing
- 4 Apply penetration seal with L shape collars



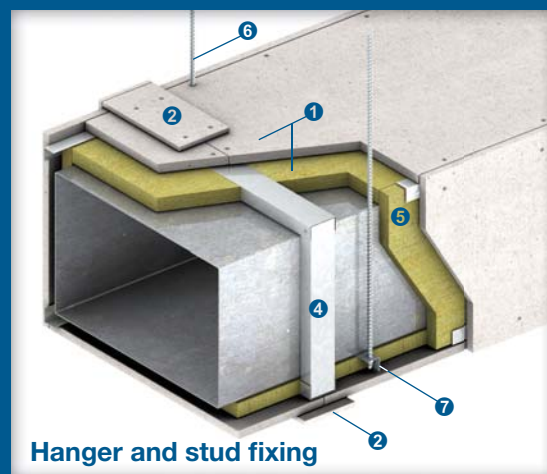
Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ❶ PROMATECT®-H board with or without mineral wool, requirements in accordance with table below
- ❷ PROMATECT®-H cover strips 100mm wide, thickness in accordance with table below
- ❸ PROMATECT®-H collars 150mm wide, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape

Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density
120/120/-	9mm	Not required
120/120/30 ⁽¹⁾	15mm	Not required
120/120/60 ⁽¹⁾	9mm	50mm x 80kg/m ³
120/120/120 ⁽¹⁾	9mm / 12mm / 15mm	100mm / 80mm / 50mm x 100kg/m ³

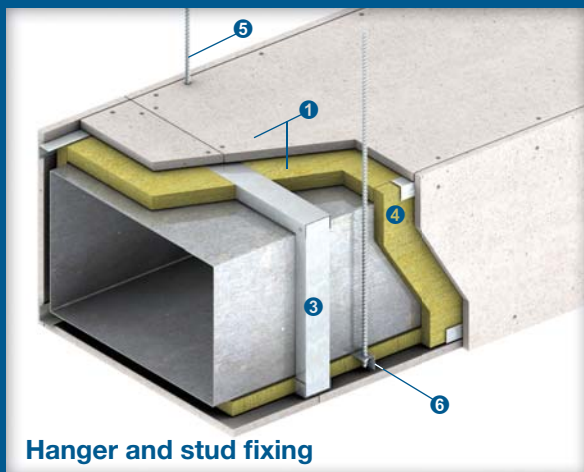
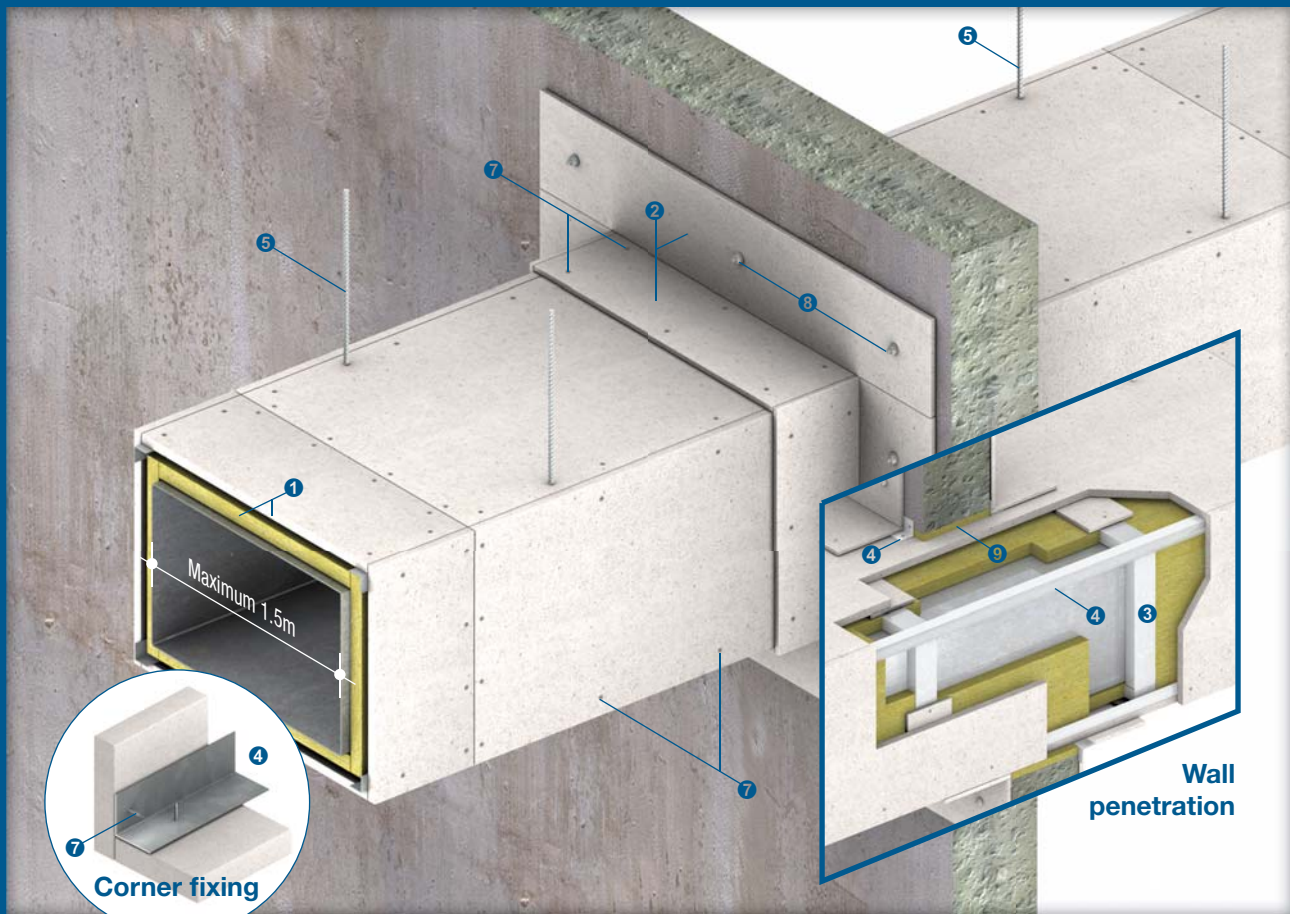
⁽¹⁾ Test approval to BS 476: Part 24: 1987 only

- ❹ Galvanised steel channels minimum 50mm x 50mm x 0.9mm thick coinciding with board joints
- ❺ Galvanised steel angles 30mm x 30mm x 0.8mm thick
- ❻ Steel rod hangers (see page 3 for maximum stress allowance calculation)



- ❼ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❽ No. 8 self-tapping screws at nominal 200mm centres
- ❾ M8 anchor bolts at nominal 500mm centres
- ❿ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 1500mm width of steel ducts and on page 9 up to 6000mm width x 2500mm height. For larger ducts, please consult Promat for variations on the supporting components



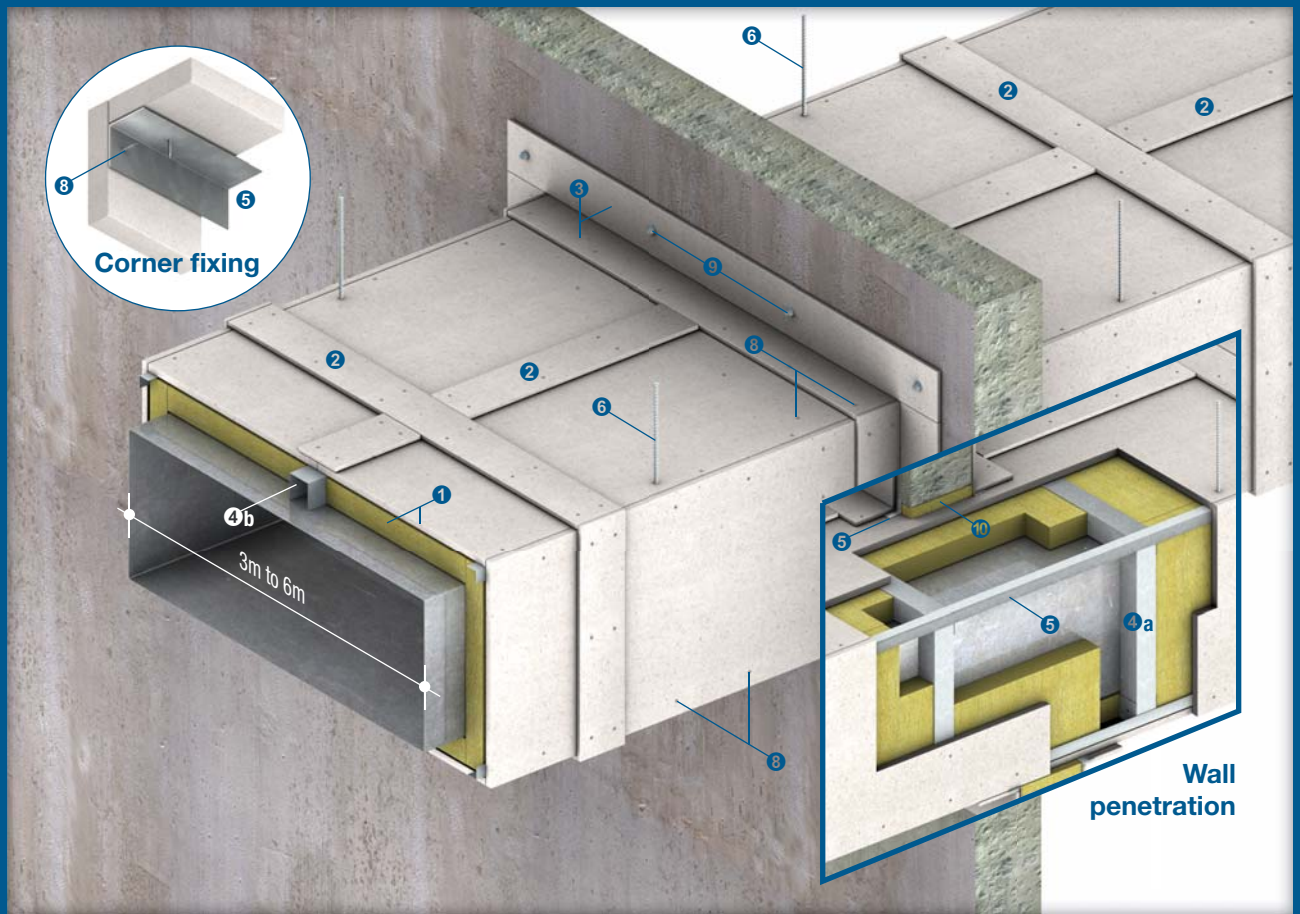
Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density	Maximum stress allowance of hangers
120/120/-	9mm	Not required	10N/mm ²
120/120/60	9mm 12mm	25mm x 80kg/m ³ 25mm x 60kg/m ³	10N/mm ²
120/120/120	12mm 15mm	Two layers of 25mm x 100kg/m ³ 30mm x 100kg/m ³	10N/mm ²

- ③ Galvanised steel channels minimum 50mm x 50mm x 0.8mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 0.6mm thick
- ⑤ Steel rod hangers, maximum stress allowance in accordance with table above
- ⑥ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑦ No. 8 self-tapping screws at nominal 200mm centres
- ⑧ M8 anchor bolts at nominal 500mm centres
- ⑨ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① PROMATECT®-H board with or without mineral wool, requirements in accordance with table at top right
- ② PROMATECT®-H collars 150mm wide, thickness in accordance with table at top right, fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 1500mm width of steel ducts and on page 9 up to 6000mm width x 1500mm height. For larger ducts, please consult Promat for variations on the supporting components



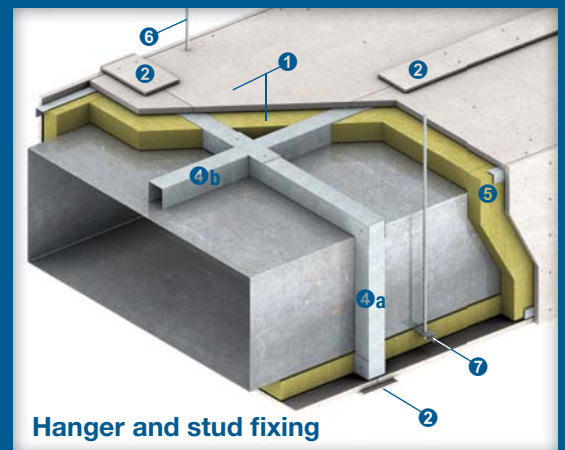
Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ① PROMATECT®-H board with or without mineral wool, requirements in accordance with table below
- ② PROMATECT®-H cover strips, thickness in accordance with table below
- ③ PROMATECT®-H collars 150mm wide, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape
- ④a Galvanised steel channels minimum 50mm x 50mm x 0.9mm thick coinciding with board joints, spaced at centres in accordance with the duct width to ensure an unsupported area ≤ 15000mm²

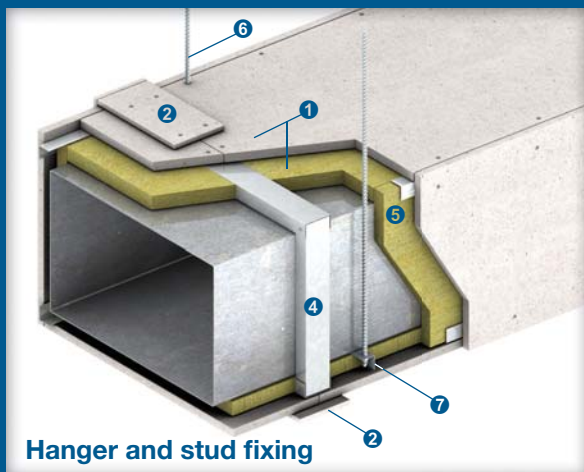
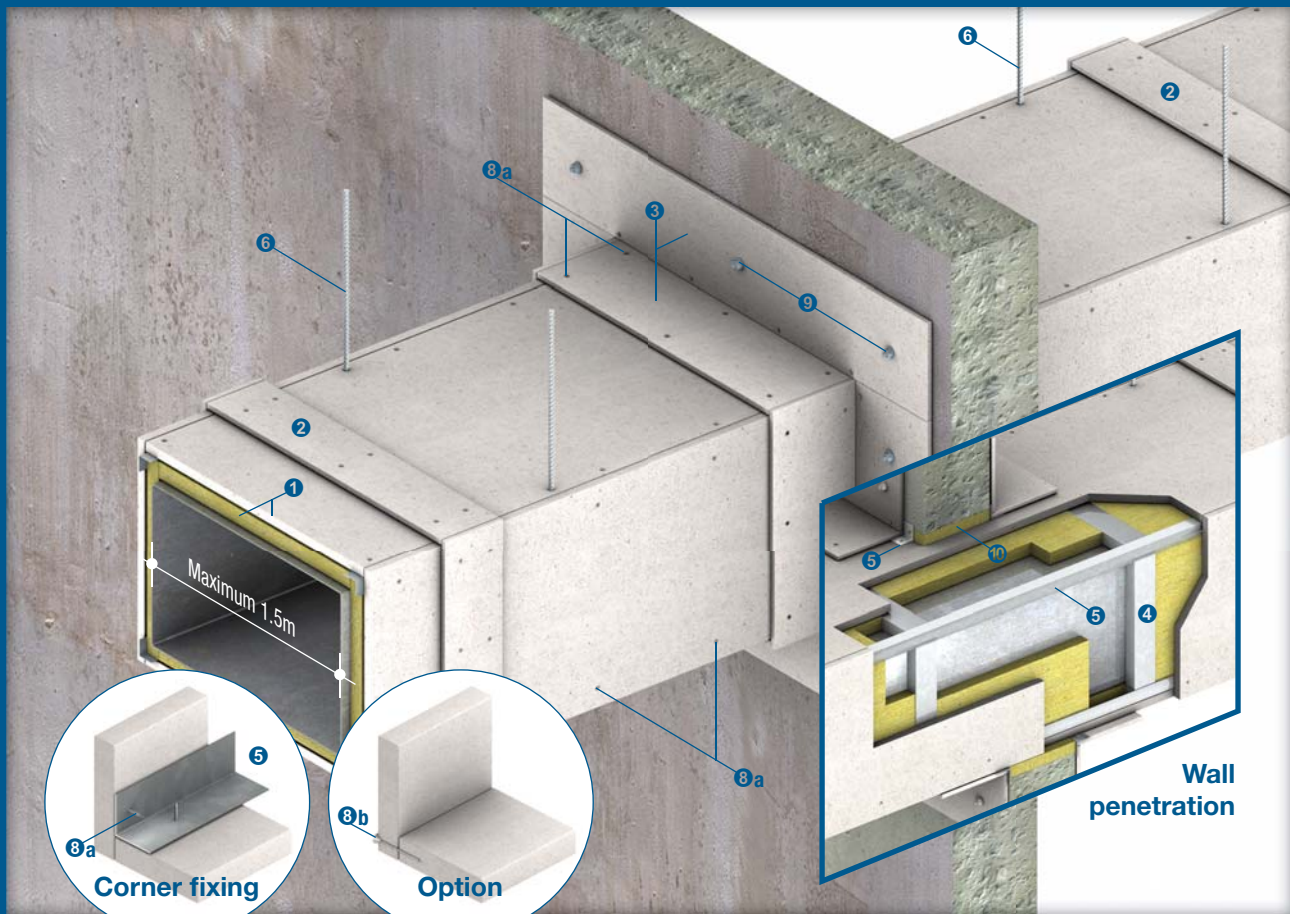
Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density
120/120/-	9mm	Not required
120/120/30 ⁽¹⁾	15mm	Not required
120/120/60 ⁽¹⁾	9mm	50mm x 100kg/m ³
120/120/120 ⁽¹⁾	9mm / 12mm / 15mm	100mm / 80mm / 50mm x 100kg/m ³

⁽¹⁾ Test approval to BS 476: Part 24: 1987 only

- ④b Additional support of galvanised steel channel at middle span of the duct (please consult Promat for construction details)
- ⑤ Galvanised steel angles 30mm x 30mm x 0.8mm thick
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)



- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧ No. 8 self-tapping screws at nominal 200mm centres
- ⑨ M8 anchor bolts at nominal 500mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct



Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density
240/240/-	12mm	Not required
240/240/30 ⁽¹⁾	12mm / 20mm	50mm x 60kg/m ³ / Not required
240/240/60 ⁽¹⁾	12mm	50mm x 100kg/m ³
240/240/120 ⁽¹⁾	12mm / 15mm	80mm x 100kg/m ³ / 50mm x 100kg/m ³
240/240/240 ⁽¹⁾	25mm	Two layers of 50mm x 100kg/m ³

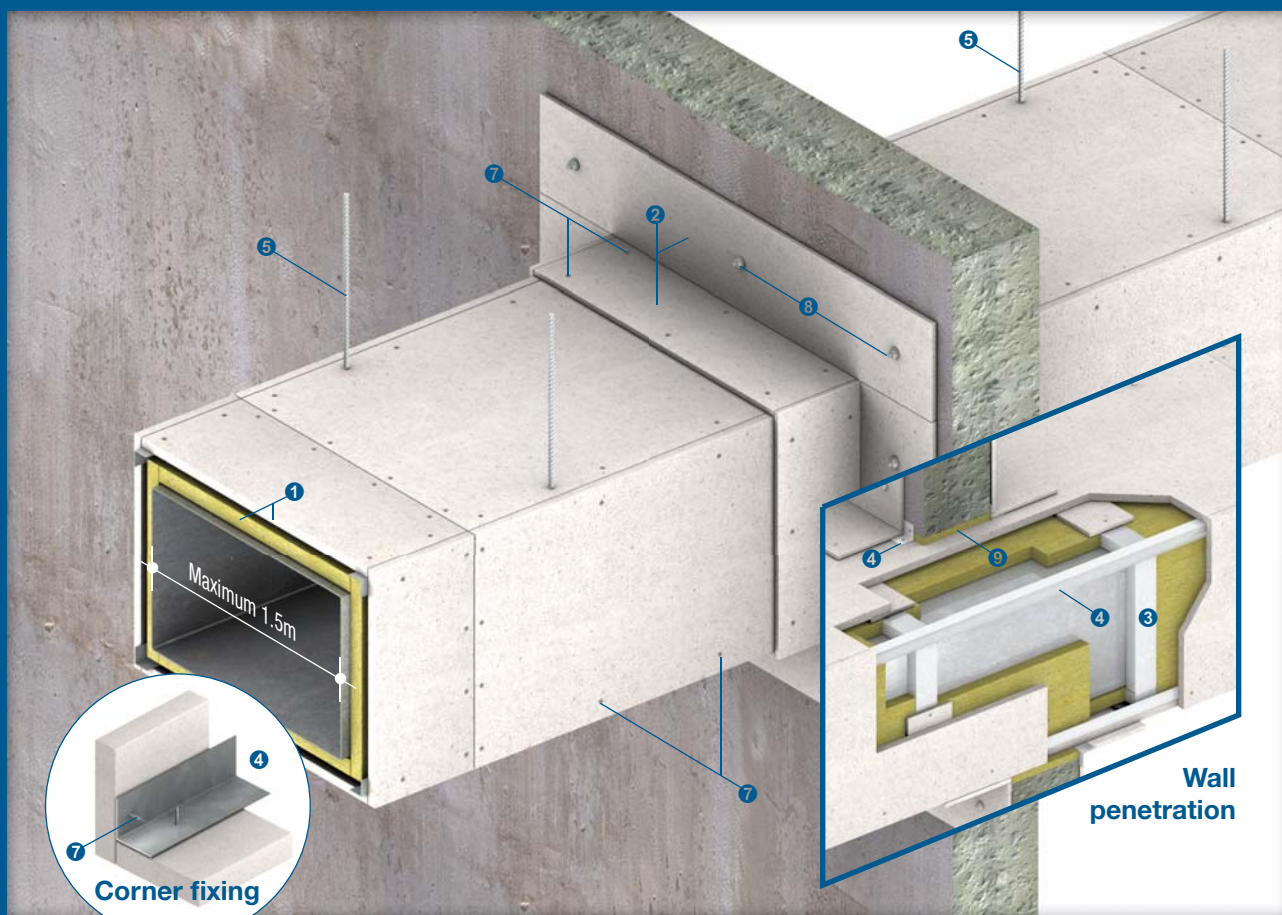
⁽¹⁾ Test approval to BS 476: Part 24: 1987 only

- ④ Galvanised steel channels minimum 50mm x 50mm x 0.9mm thick (except 100mm x 50mm x 0.9mm thick for 240/240/240 fire resistance) coinciding with board joints
- ⑤ Galvanised steel angles 30mm x 30mm x 0.8mm thick
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧a No. 8 self-tapping screws at nominal 200mm centres
- ⑧b 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater (applicable for 20mm or 25mm thick boards only)
Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes
- ⑨ M8 anchor bolts at nominal 500mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ① PROMATECT®-H board with or without mineral wool, requirements in accordance with table at top right
- ② PROMATECT®-H cover strips 100mm wide, thickness in accordance with table at top right
- ③ PROMATECT®-H collars 150mm wide, thickness in accordance with table at top right, fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 1500mm width of steel ducts and on page 12 up to 6000mm width x 1500mm height. For larger ducts, please consult Promat for variations on the supporting components

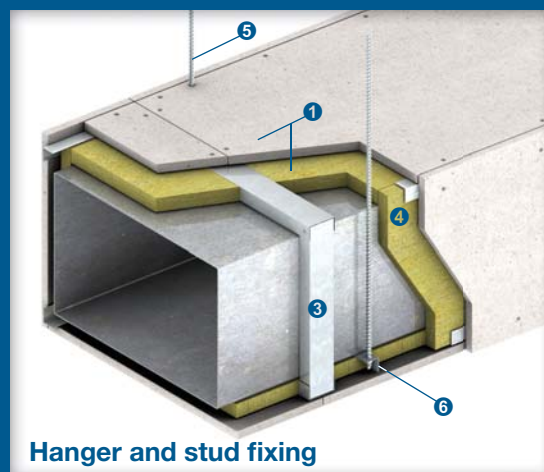


Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① PROMATECT®-H board with or without mineral wool, requirements in accordance with table below
- ② PROMATECT®-H collars 150mm wide, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape

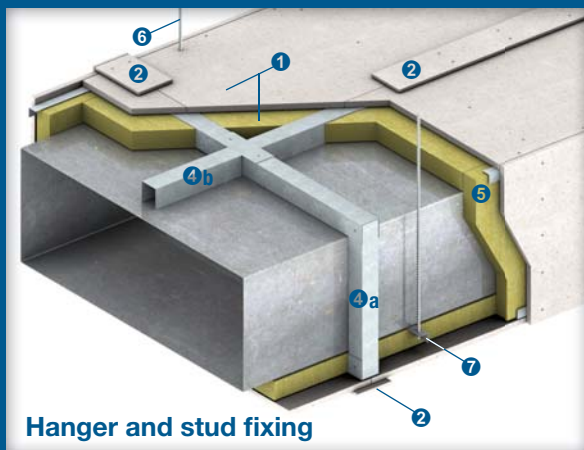
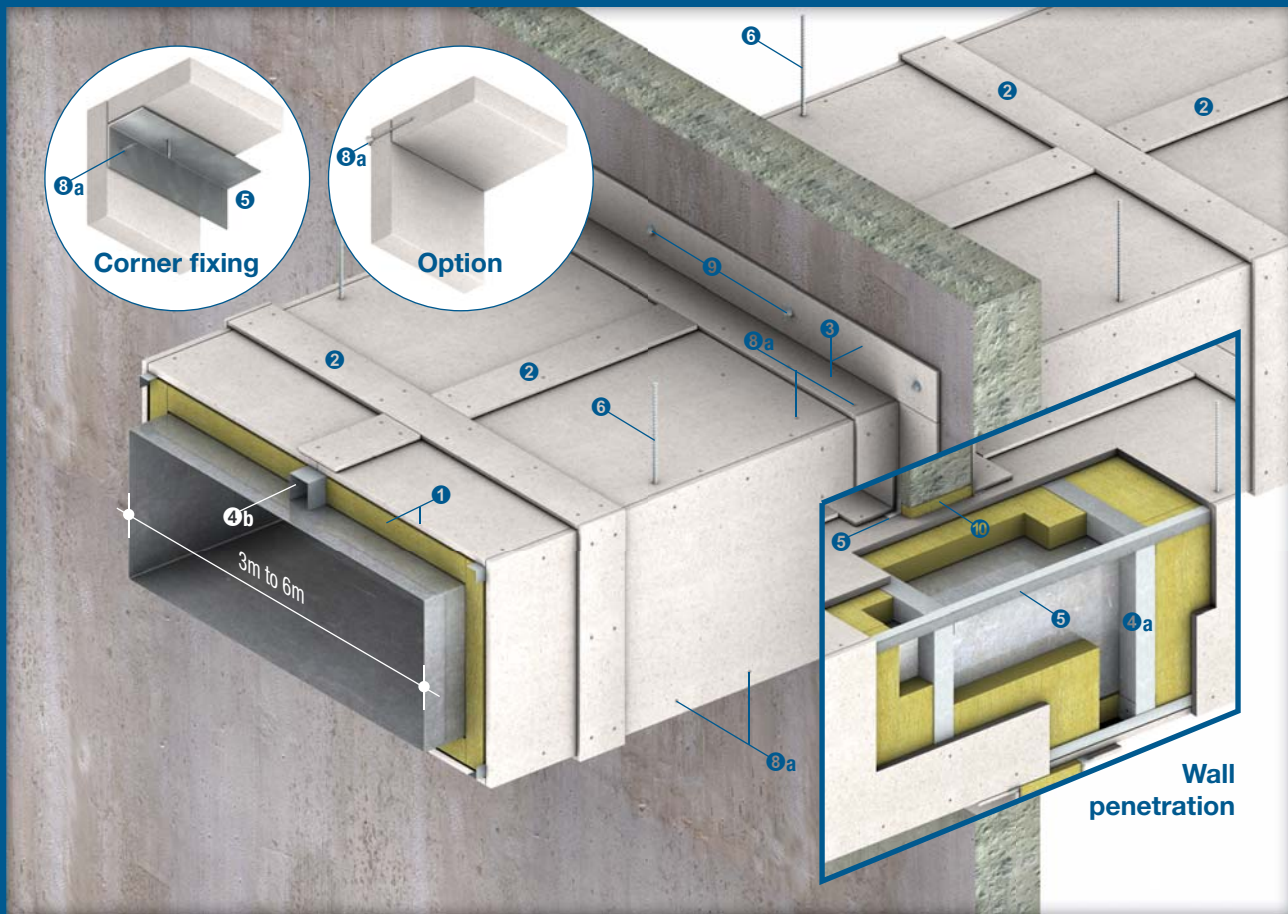
Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density	Maximum stress allowance of hangers
240/240/-	12mm	Not required	6N/mm ²
240/240/240	25mm	Two layers of 50mm x 100kg/m ³	6N/mm ²

- ③ Galvanised steel channels minimum 50mm x 50mm x 0.8mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 0.6mm thick
- ⑤ Steel rod hangers, maximum stress allowance in accordance with table above
- ⑥ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)



- ⑦ No. 8 self-tapping screws at nominal 200mm centres
- ⑧ M8 anchor bolts at nominal 500mm centres
- ⑨ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 1500mm width of steel ducts and on page 12 up to 6000mm width x 2500mm height. For larger ducts, please consult Promat for variations on the supporting components



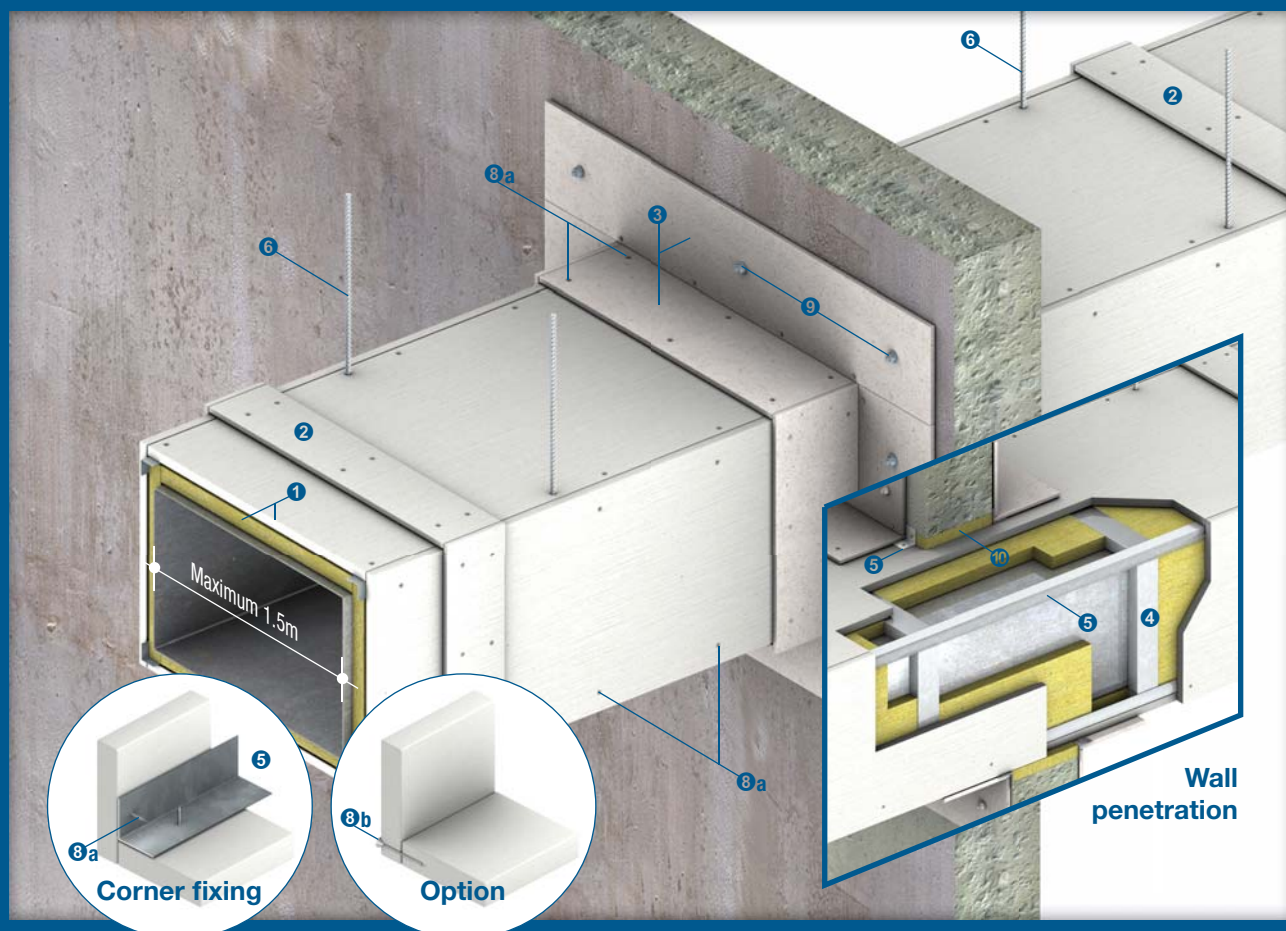
Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density
240/240/-	12mm	Not required
240/240/30 ⁽¹⁾	12mm / 20mm	50mm x 60kg/m ³ / Not required
240/240/60 ⁽¹⁾	12mm	50mm x 100kg/m ³
240/240/120 ⁽¹⁾	12mm / 15mm	80mm x 100kg/m ³ / 50mm x 100kg/m ³
240/240/240 ⁽¹⁾	25mm	Two layers of 50mm x 100kg/m ³

⁽¹⁾ Test approval to BS 476: Part 24: 1987 only

- ④b Additional support of galvanised steel channel at middle span of the duct (please consult Promat for construction details)
- ⑤ Galvanised steel angles 30mm x 30mm x 0.8mm thick
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧a No. 8 self-tapping screws at nominal 200mm centres
- ⑧b 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater (applicable for 20mm or 25mm thick boards only)
Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes
- ⑨ M8 anchor bolts at nominal 500mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ① PROMATECT®-H board with or without mineral wool, requirements in accordance with table at top right
- ② PROMATECT®-H cover strips, requirements in accordance with table at top right
- ③ PROMATECT®-H collars 150mm wide, thickness in accordance with table at top right, fitted around the duct on both sides of the wall forming an L shape
- ④a Galvanised steel channels minimum 50mm x 50mm x 0.9mm thick (except 50mm x 100mm x 0.9mm for 240/240/240 fire resistance) coinciding with board joints, spaced at centres in accordance with the duct width to ensure an unsupported area ≤ 1500mm²



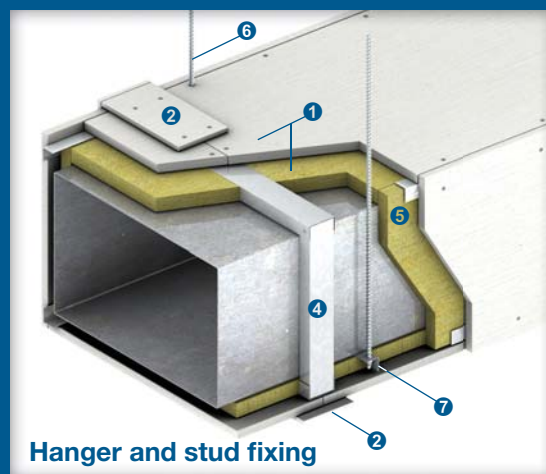
Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ❶ PROMATECT®-L500 board with or without mineral wool, requirements in accordance with table below
- ❷ PROMATECT®-H cover strips 100mm wide x 9mm thick
- ❸ PROMATECT®-L500 collars 100mm wide or 400mm wide⁽¹⁾, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape

Fire resistance	Board/collar thickness	Mineral wool thickness x density
120/120/120	20mm	50mm x 100kg/m ³
	50mm ⁽¹⁾	Not required

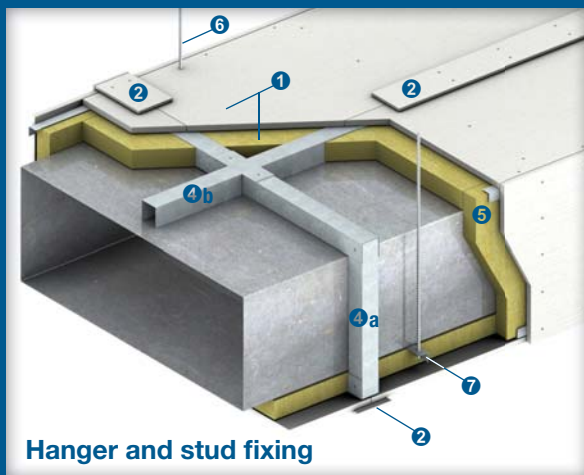
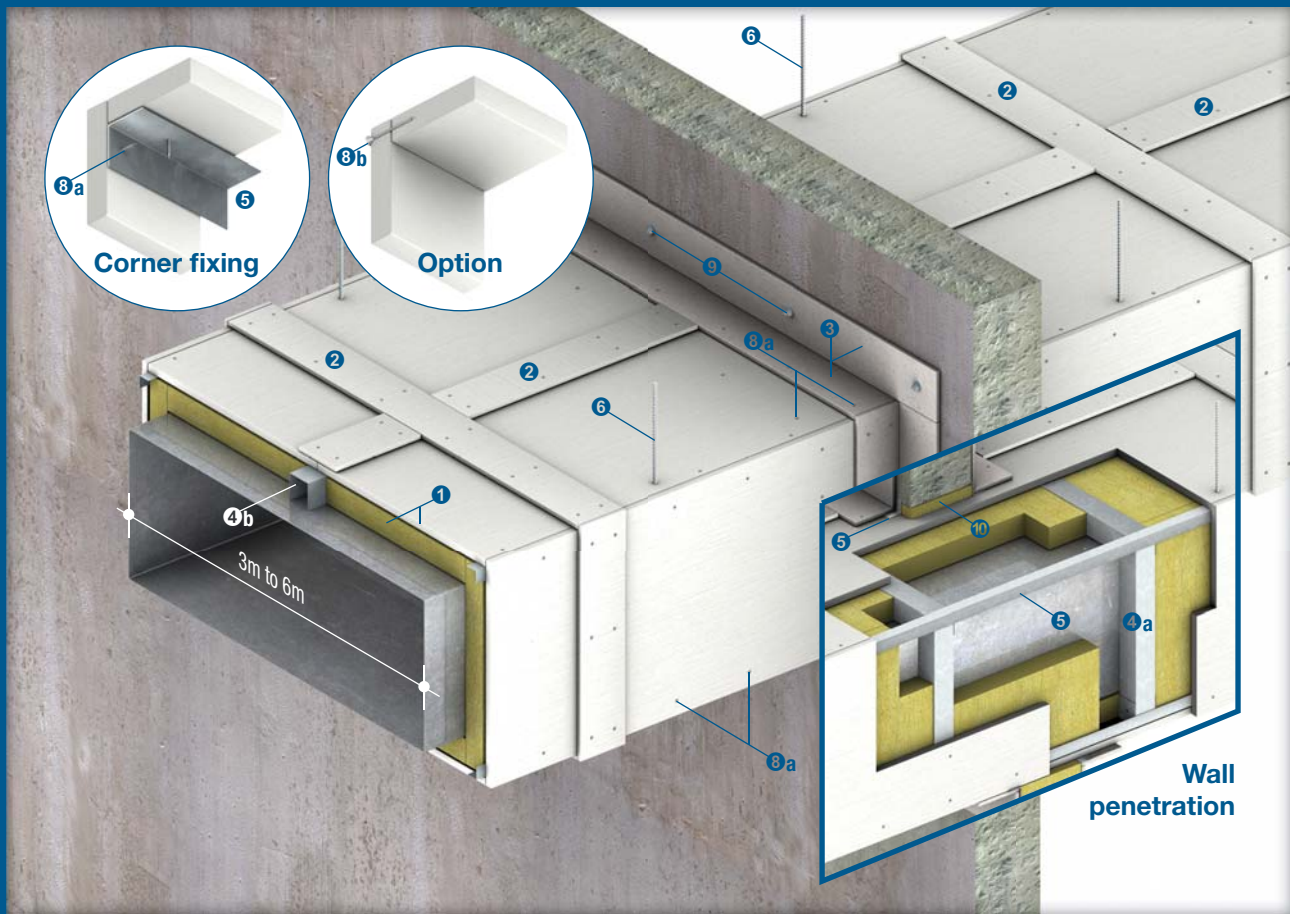
⁽¹⁾ Test approval to AS 1530: Part 4: 2005 only

- ❹ Galvanised steel channels 50mm x 50mm x 0.9mm thick coinciding with board joints
- ❺ Galvanised steel angles 25mm x 25mm x 0.6mm thick
- ❻ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ❼ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)



- ⓐ No. 8 self-tapping screws at nominal 200mm centres
- ⓑ 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater. Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes
- ❸ M8 anchor bolts at nominal 500mm centres
- ❹ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 1500mm width of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



Fire resistance	Board/collar thickness	Mineral wool thickness x density
120/120/120	20mm	50mm x 100kg/m ³
	50mm ⁽¹⁾	Not required

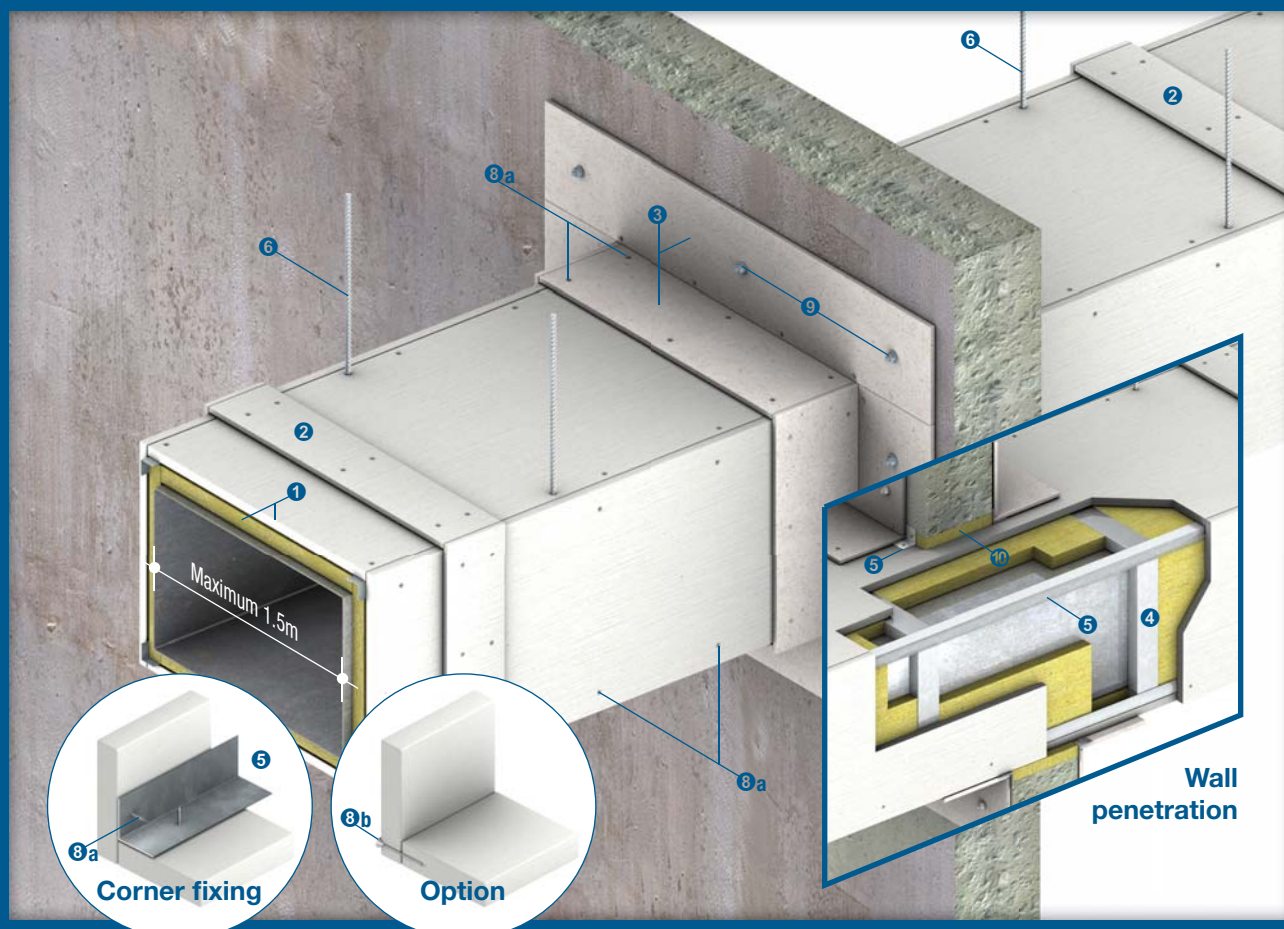
⁽¹⁾ Test approval to AS 1530: Part 4: 2005 only

- ④a Galvanised steel channels 50mm x 50mm x 0.9mm thick coinciding with board joints, spaced at centres in accordance with the duct width to ensure an unsupported area ≤ 15000mm²
- ④b Additional support of galvanised steel channel at middle span of the duct (please consult Promat for construction details)
- ⑤ Galvanised steel angles 40mm x 40mm x 0.6mm thick
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧a No. 8 self-tapping screws at nominal 200mm centres
- ⑧b 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater
Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes
- ⑨ M8 anchor bolts at nominal 500mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

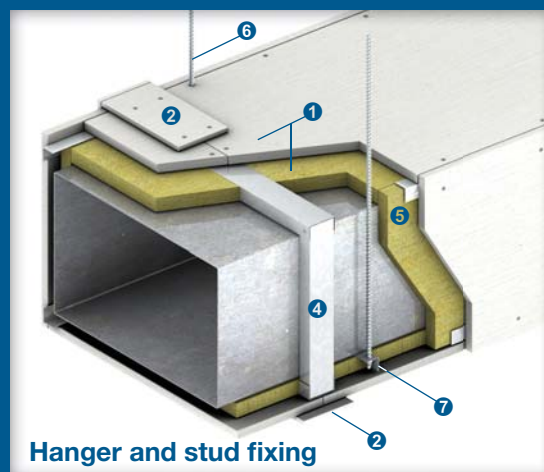
- ① PROMATECT®-L500 board with or without mineral wool, requirements in accordance with table at top right
- ② PROMATECT®-H cover strips 100mm wide x 9mm thick
- ③ PROMATECT®-L500 collars 100mm wide or 400mm wide⁽¹⁾, thickness in accordance with table at top right, fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 6000mm width x 3000mm height of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



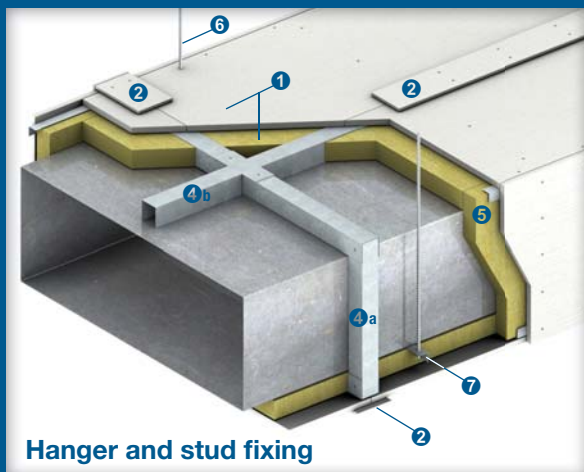
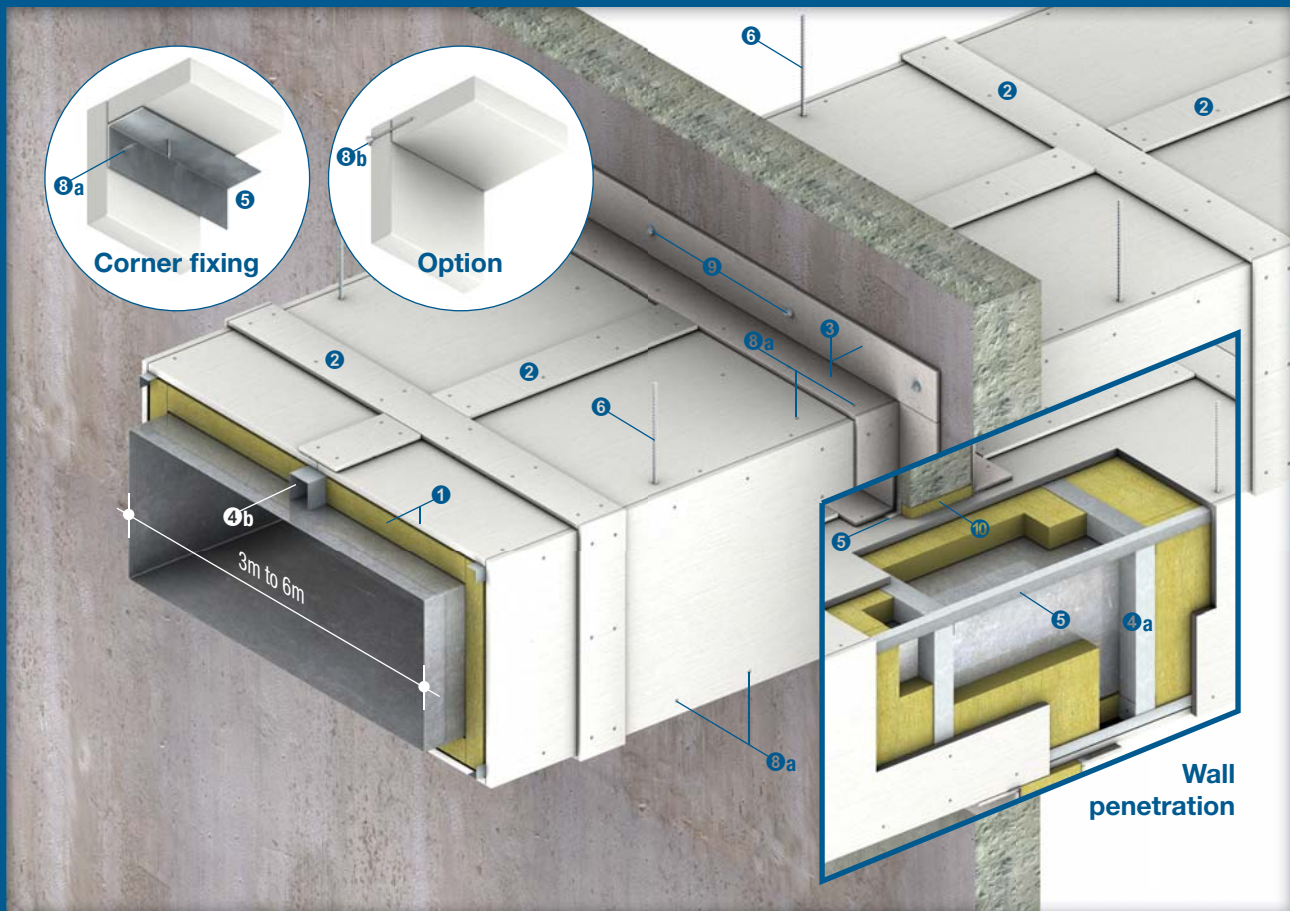
Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① PROMATECT®-L500 board 50mm thick with mineral wool 75mm thick x 100kg/m³
- ② PROMATECT®-H cover strips 100mm wide x 9mm thick
- ③ PROMATECT®-L500 collars 100mm wide x 50mm thick fitted around the duct on both sides of the wall forming an L shape
- ④ Galvanised steel channels 50mm x 75mm x 0.9mm thick coinciding with board joints
- ⑤ Galvanised steel angles 25mm x 25mm x 0.6mm thick
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧a No. 8 self-tapping screws at nominal 200mm centres



- ⑧b 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater
Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes
- ⑨ M8 anchor bolts at nominal 500mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 1500mm width of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



④a Galvanised steel channels 50mm x 0.9mm thick coinciding with board joints, width in accordance with the below table, spaced at centres in accordance with the duct width to ensure an unsupported area ≤ 15000mm²

④b Additional support of galvanised steel channel at middle span of the duct (please consult Promat for construction details)

⑤ Galvanised steel angles 40mm x 40mm x 0.6mm thick

⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)

⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)

⑧a No. 8 self-tapping screws at nominal 200mm centres

⑧b 50mm long No. 8 deep threaded drywall screws fixed board face to board edge with a minimum 25mm penetration or two times of the board thickness, whichever is greater

Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes

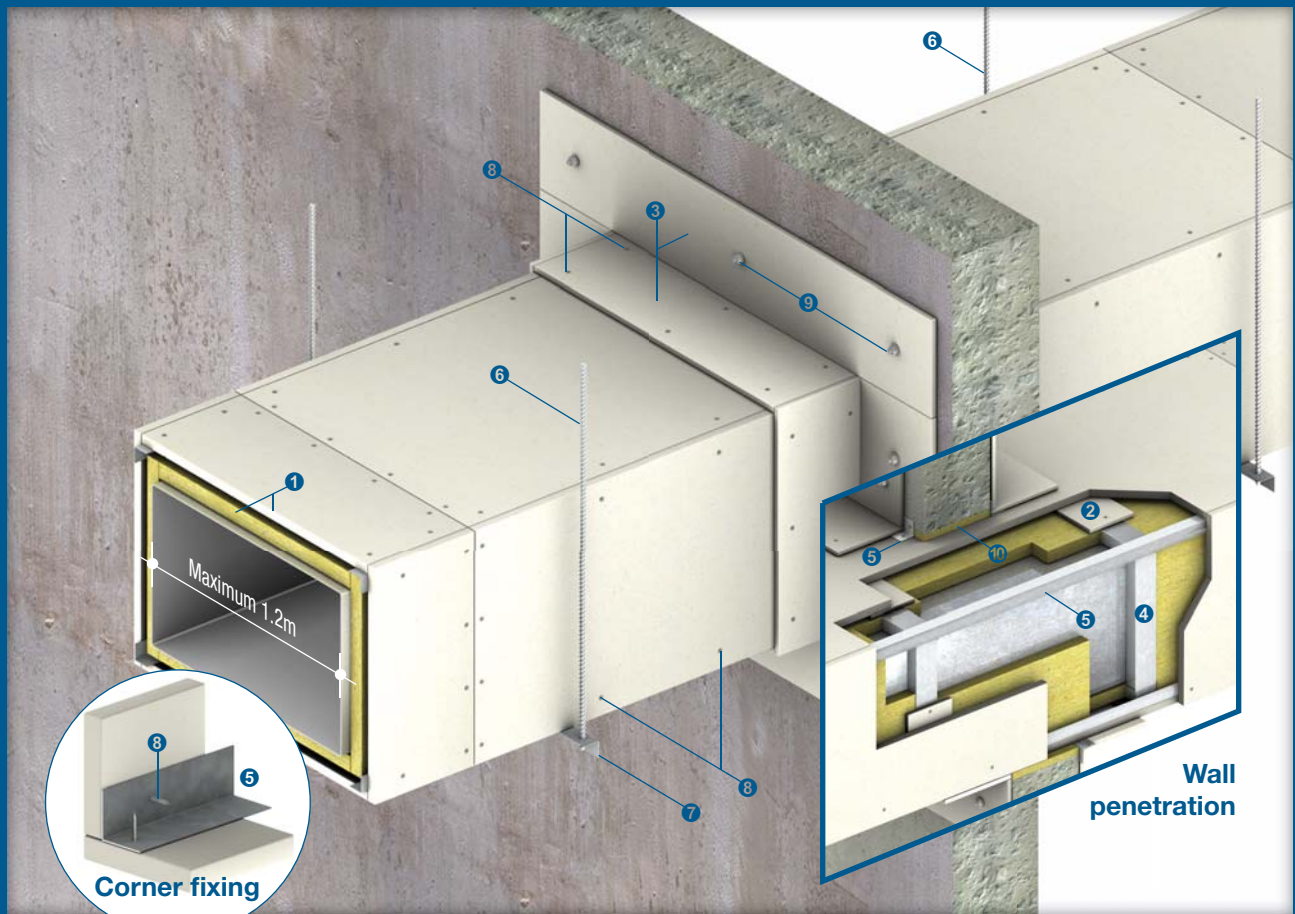
⑨ M8 anchor bolts at nominal 500mm centres

⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① PROMATECT®-L500 board 50mm thick with mineral wool 75mm thick x 100kg/m³
- ② PROMATECT®-H cover strips 100mm wide x 9mm thick
- ③ PROMATECT®-L500 collars 100mm wide x 50mm thick fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 6000mm width x 3000mm height of steel ducts. For larger ducts, please consult Promat for variations on the supporting components

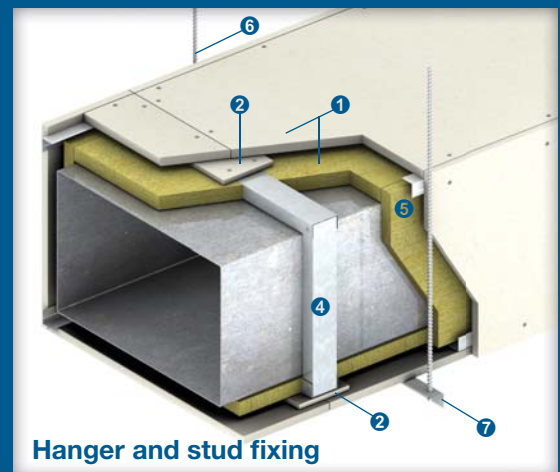


Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and AS 1530: Part 4: 2005

- ① PROMATECT® 50 board 15mm thick with mineral wool 50mm thick x 100kg/m³
- ② PROMATECT® 50 cover strips 100mm wide x 15mm thick
- ③ PROMATECT® 50 collars 200mm wide x 15mm thick fitted around the duct on both sides of the wall forming an L shape
- ④ Galvanised steel channels minimum 50mm x 35mm x 0.55mm thick coinciding with board joints
- ⑤ Galvanised steel angles, requirements in accordance with table below

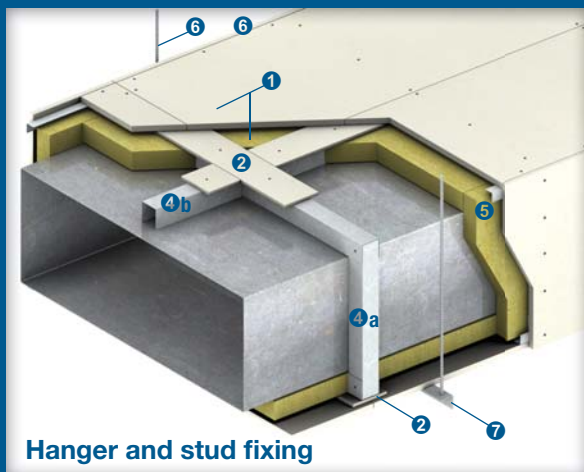
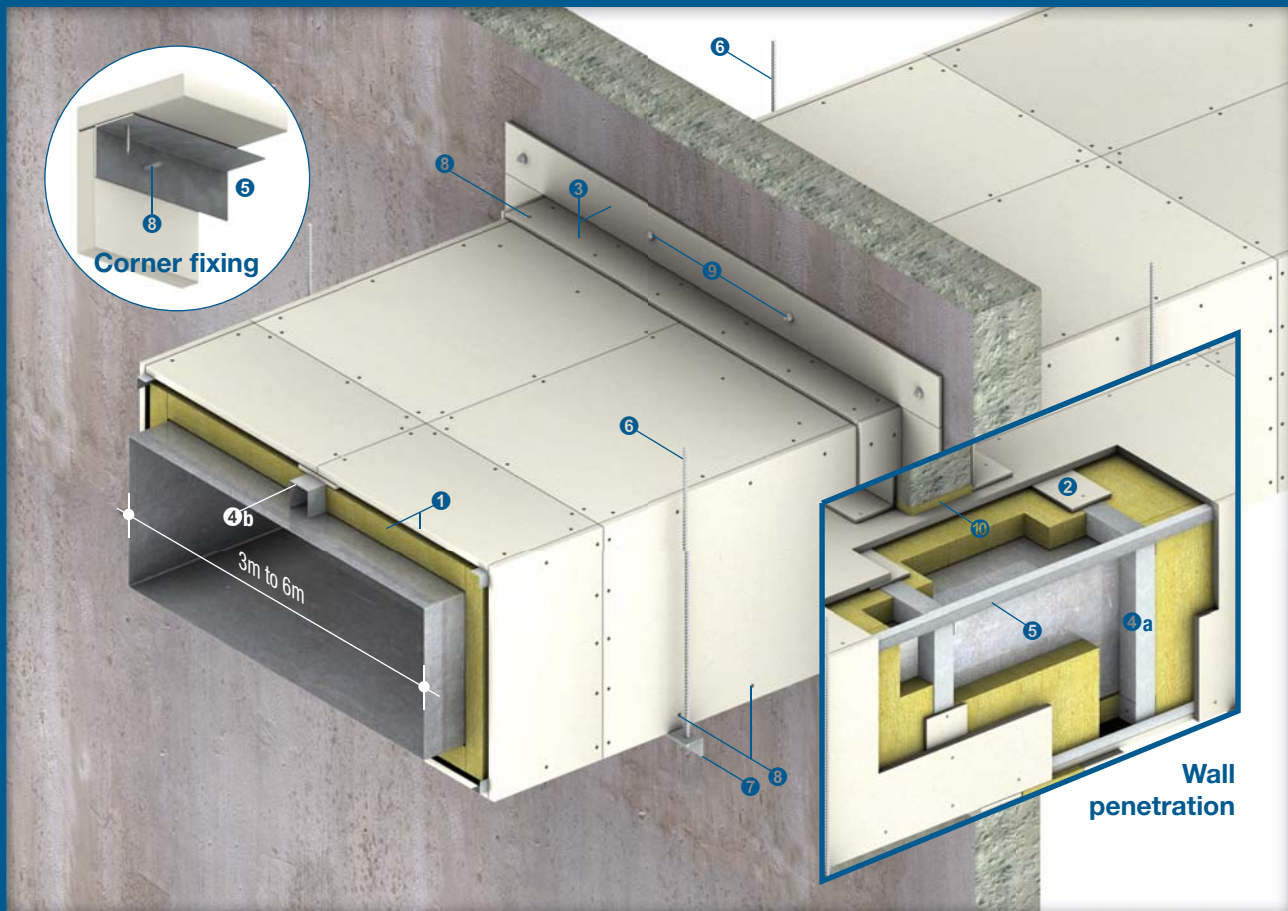
Maximum width of duct	Steel duct sheet thickness	Galvanised steel angle	Stiffening collar
Up to 800mm	0.9mm	25mm x 25mm x 3mm	Not required
Up to 1000mm	0.9mm	30mm x 30mm x 4mm	Not required
Up to 1500mm	1.0mm	30mm x 30mm x 4mm	Required
Up to 2500mm	1.0mm	40mm x 40mm x 4mm	Required
Up to 3000mm	1.2mm	50mm x 50mm x 5mm	Required
Up to 6000mm	1.2mm	70mm x 70mm x 6mm	Required

- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)



- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧ No. 8 self-tapping screws at nominal 200mm centres, 35mm long at corners and 50mm long at board joints
- ⑨ M6 anchor bolts at nominal 300mm centres
- ⑩ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 1200mm width of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



Hanger and stud fixing

Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and AS 1530: Part 4: 2005

- ❶ PROMATECT® 50 board 15mm thick with mineral wool 50mm thick x 100kg/m³
- ❷ PROMATECT® 50 cover strips 100mm wide x 15mm thick

- ❸ PROMATECT® 50 collars 200mm wide x 15mm thick fitted around the duct on both sides of the wall forming an L shape
- ❹a Galvanised steel channels minimum 50mm x 35mm x 0.55mm thick coinciding with board joints, spaced at centres in accordance with the duct width to ensure an unsupported area ≤ 15000mm²
- ❹a Additional support of galvanised steel channel at middle span of the duct (please consult Promat for construction details)
- ❺ Galvanised steel angles 50mm x 50mm x 5mm thick for ducts up to 3000mm wide or 70mm x 70mm x 6mm thick for ducts up to 6000mm wide
- ❻ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ❼ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❽ No. 8 self-tapping screws at nominal 200mm centres, 35mm long at corners and 50mm long at board joints
- ❾ M6 anchor bolts at nominal 300mm centres
- ❿ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct

The above cladding system is approved for up to 6000mm width x 1500mm height of steel ducts. For larger ducts, please consult Promat for variations on the supporting components

There are multiple options available when joining galvanised steel ducts to PROMATECT®-H, PROMATECT®-L500 or PROMATECT® 50 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, PROMATECT®-L500 or PROMATECT® 50 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.

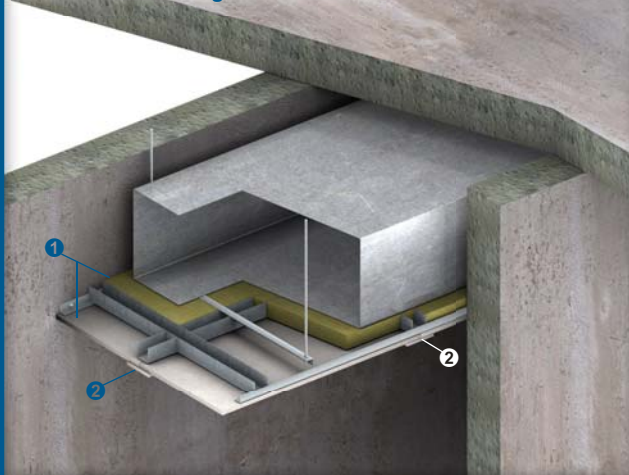
At wall penetrations, the gaps between the duct and the reveals of the opening must be filled with mineral wool, of minimum density 100kg/m³ and an L shaped collar formed from the PROMATECT®-H, PROMATECT®-L500 or PROMATECT® 50 boards around the duct on both sides of the wall. The minimum size of the 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.

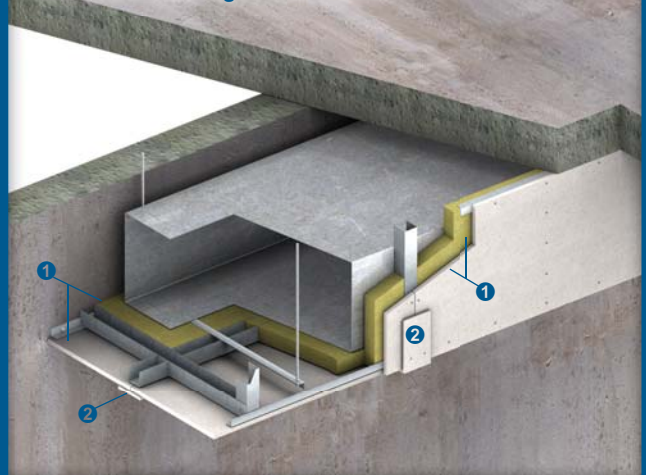
Fire resistant ducts can be formed where the substrate from which the steel duct is supported provides protection to some areas, thus one, two and three sided solutions in combination with walls and ceilings are available. See below and the following pages for the difference of using PROMATECT®-H, PROMATECT®-L500 or PROMATECT® 50 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, PROMATECT®-L500 or PROMATECT® 50 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® boards. For larger ducts up to 15000mm wide, please consult Promat for variations on the supporting components.

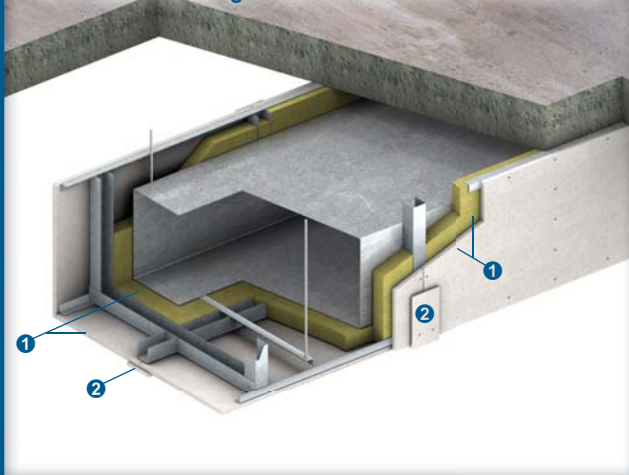
One sided cladding to steel ducts



Two sided cladding to steel ducts



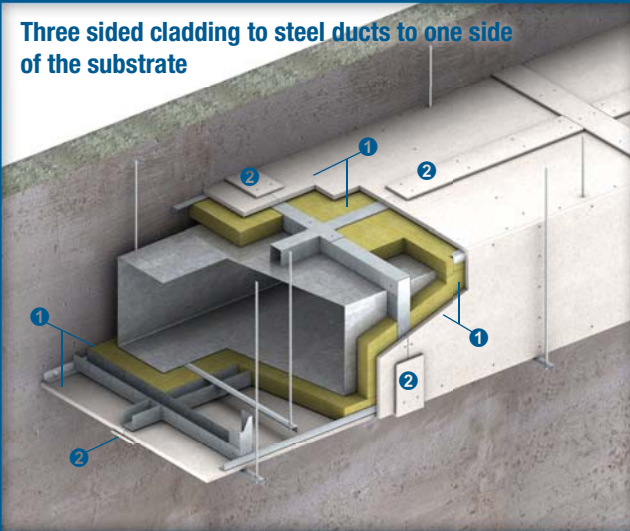
Three sided cladding to steel ducts under the substrate



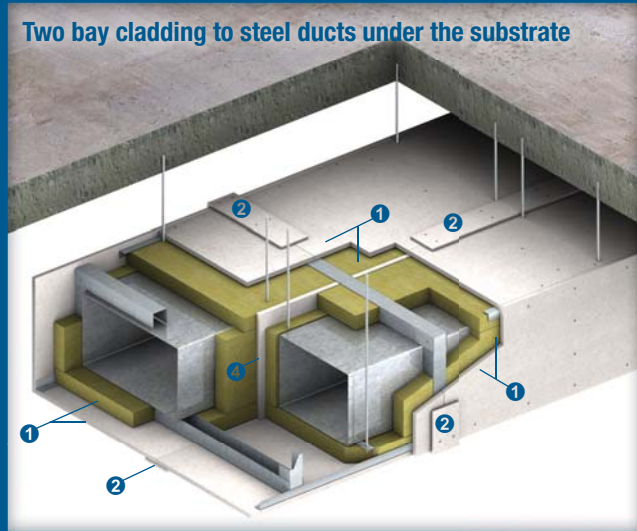
- 1 PROMATECT®-H, PROMATECT®-L500 or PROMATECT® 50 board with or without mineral wool, requirements in accordance with the tables shown on pages 7 to 18
- 2 PROMATECT®-H or PROMATECT® 50 cover strips 100mm wide (where applicable), thickness outlined on pages 7 to 18

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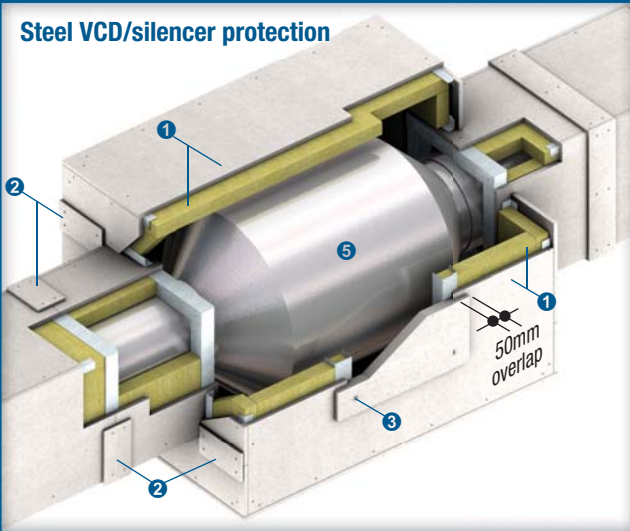
Three sided cladding to steel ducts to one side of the substrate



Two bay cladding to steel ducts under the substrate



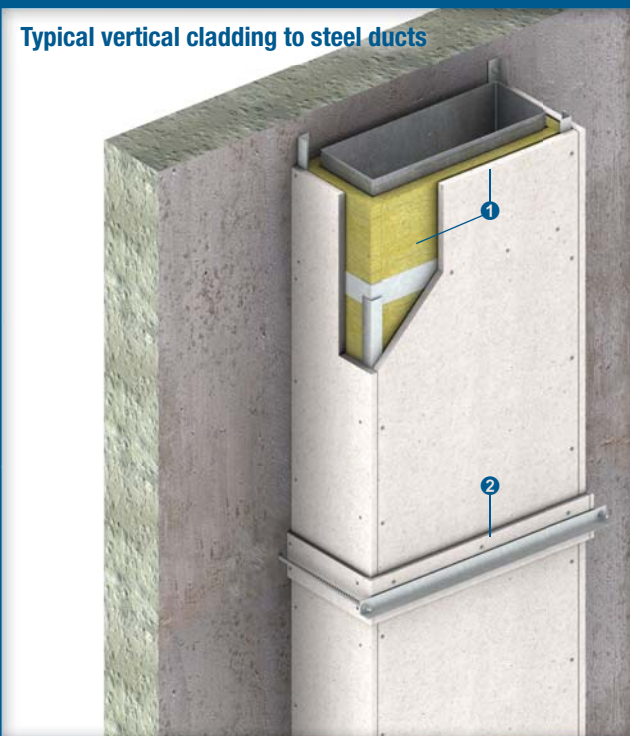
Steel VCD/silencer protection

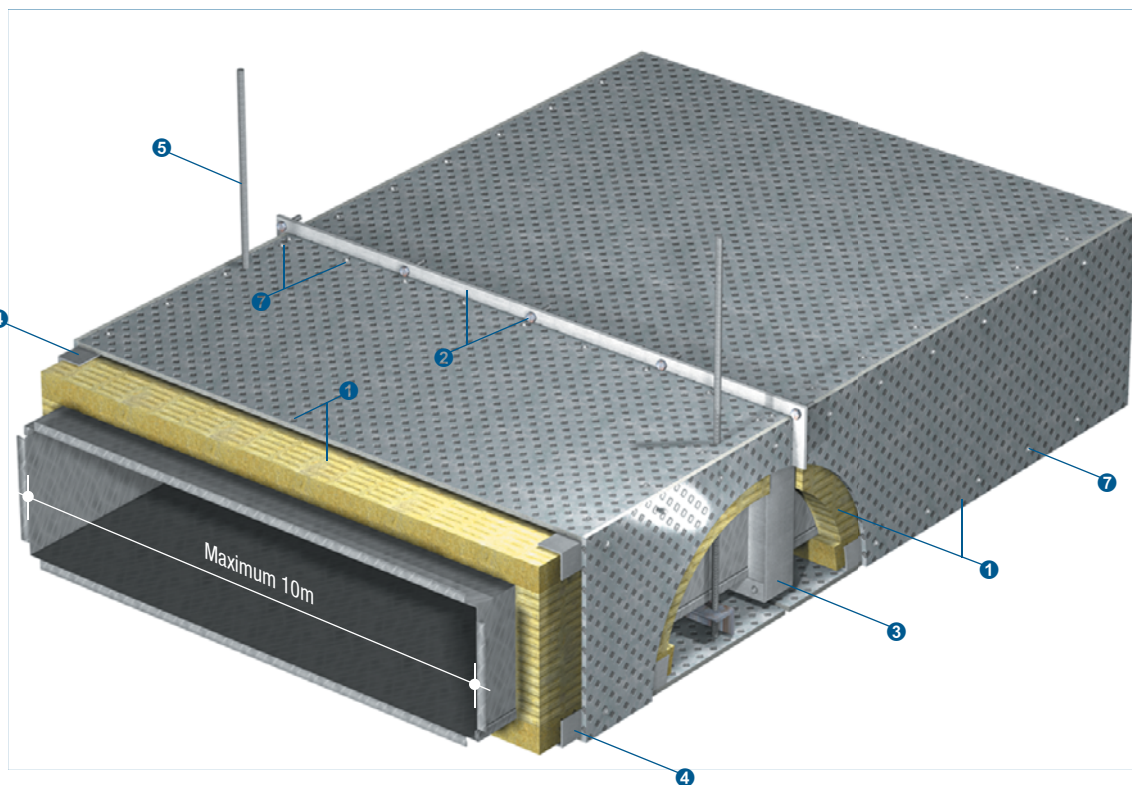


- 1 PROMATECT®-H, PROMATECT®-L500 or PROMATECT® 50 board with or without mineral wool, requirements in accordance with the tables shown on pages 7 to 18
- 2 PROMATECT®-H or PROMATECT® 50 cover strips 100mm wide (where applicable), thickness outlined on pages 7 to 18
- 3 M6 anchor bolts at nominal 250mm centres
- 4 Dividing board of similar product and thickness required as in 1 fixed to framework using self-tapping screws at 200mm centres
- 5 Steel volume control damper (VCD)

Please consult Promat for construction details of VCD protection

Typical vertical cladding to steel ducts





Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

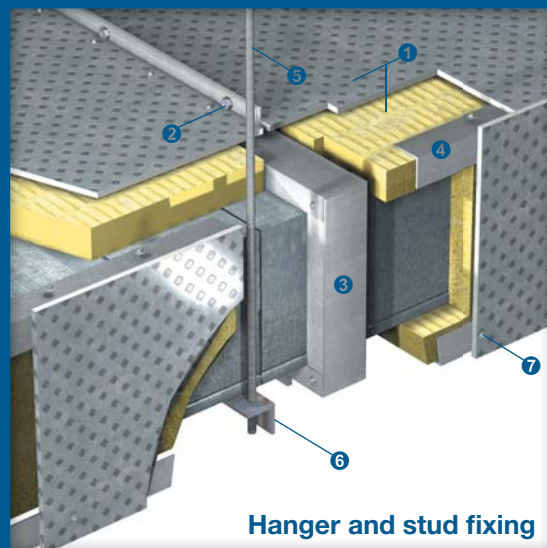
- ① PROMATECT®-S board 6mm with or without mineral wool, requirements in accordance with table below

Fire resistance	Mineral wool thickness x density
120/120/30	Not required
120/120/120	50mm x 140kg/m ³

- ② Continuous steel flange sections, fabricated by cut and welded back to back angles 50mm x 50mm x 3mm thick bolted together with M10 nuts and bolts at nominal 200mm centres

Alternatively, standard steel flange systems can be utilised for the required fire resistance performance. Please consult Promat for construction details

- ③ Galvanised steel channels 100mm x 50mm x 3mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 3mm thick for corner reinforcement purposes. No mechanical fixing required
- ⑤ Steel rod hangers (see page 3 for maximum stress allowance calculation)

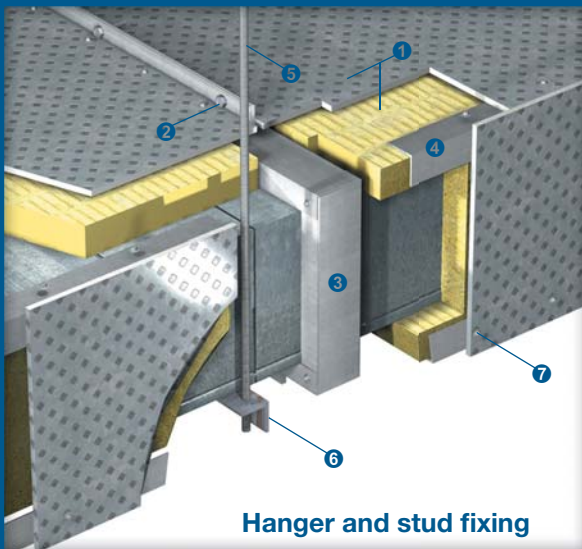
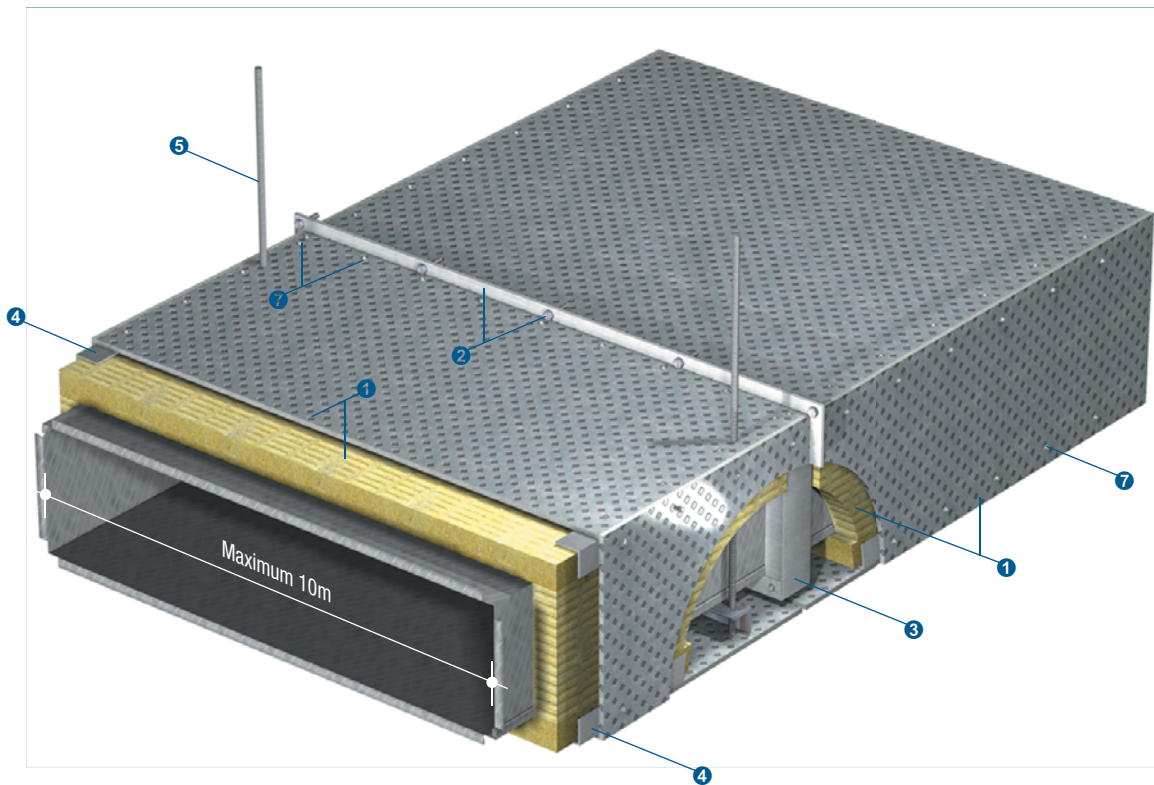


Hanger and stud fixing

- ⑥ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑦ 35mm x 5.5mm self-tapping Teks screws at nominal 200mm centres

Where the duct penetrates the wall substrate, PROMATECT®-S collars 100mm wide x 6mm thick should be fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 10000mm width x 1500mm height of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



Hanger and stud fixing

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

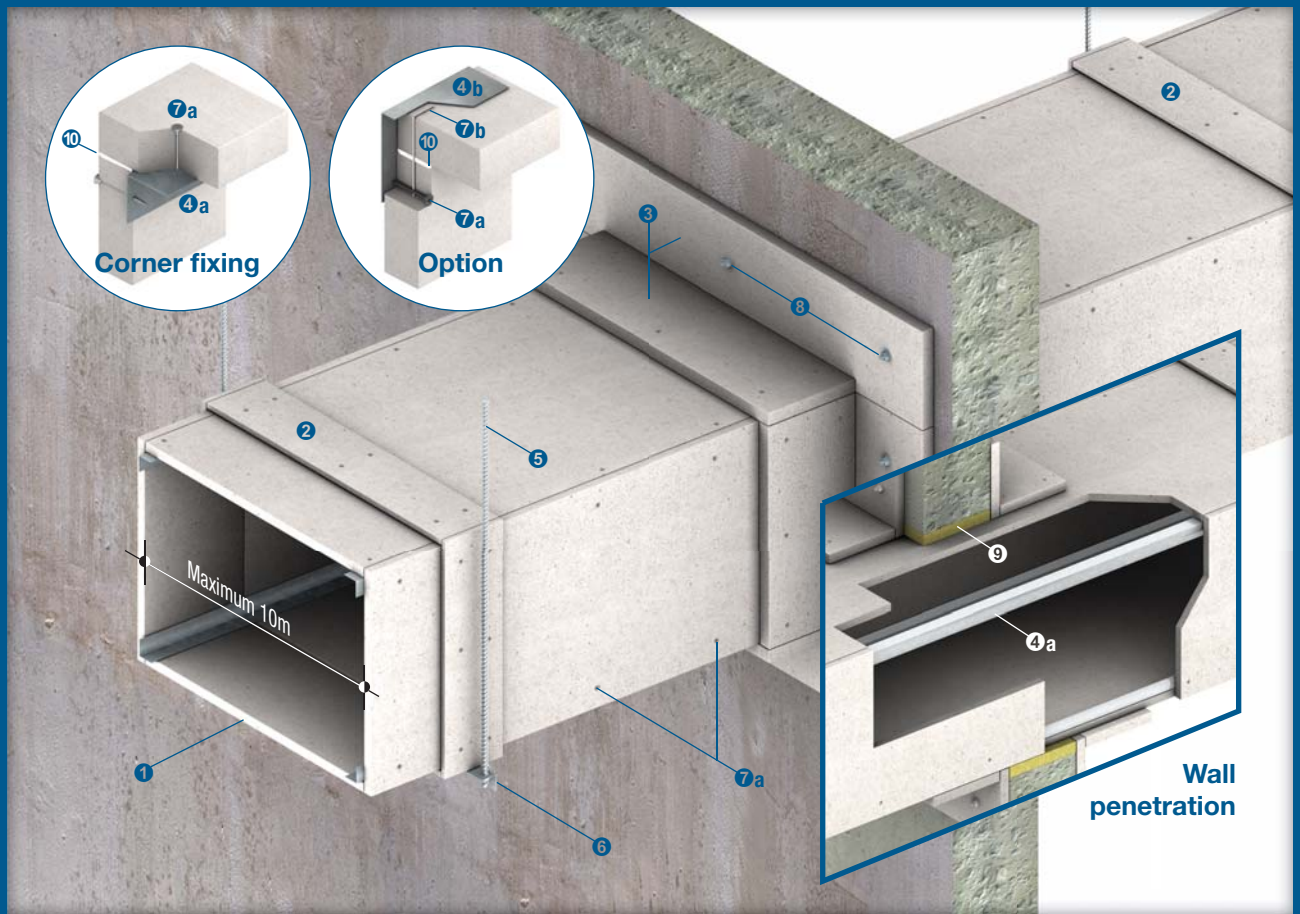
- ① PROMATECT®-S board 9.5mm thick with or without mineral wool, requirements in accordance with table at top right

Fire resistance	Mineral wool thickness x density
240/240/30	Not required
240/240/60	Not required
240/240/240	100mm x 160kg/m ³

- ② Continuous steel flange sections, fabricated by cut and welded back to back angles 50mm x 50mm x 3mm thick bolted together with M10 nuts and bolts at nominal 200mm centres
Alternatively, standard steel flange systems can be utilised for the required fire resistance performance. Please consult Promat for construction details
- ③ Galvanised steel channels 100mm x 50mm x 3mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 3mm thick for corner reinforcement purposes. No mechanical fixing required
- ⑤ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑥ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑦ 35mm x 5.5mm self-tapping Teks screws at nominal 200mm centres

Where the duct penetrates the wall substrate, PROMATECT®-S collars 100mm wide x 9.5mm thick should be fitted around the duct on both sides of the wall forming an L shape

The above cladding system is approved for up to 10000mm width x 1500mm height of steel ducts. For larger ducts, please consult Promat for variations on the supporting components



Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ❶ PROMATECT®-H board with or without mineral wool laid on surface of the board, requirements in accordance with table below
- ❷ PROMATECT®-H cover strips 100mm wide, thickness in accordance with table below
- ❸ PROMATECT®-H collars 150mm wide, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape

Fire resistance	Board/cover strip/collar thickness	Mineral wool thickness x density
120/120/-	12mm	Not required
120/120/120	15mm	100mm x 140kg/m ³ ⁽¹⁾

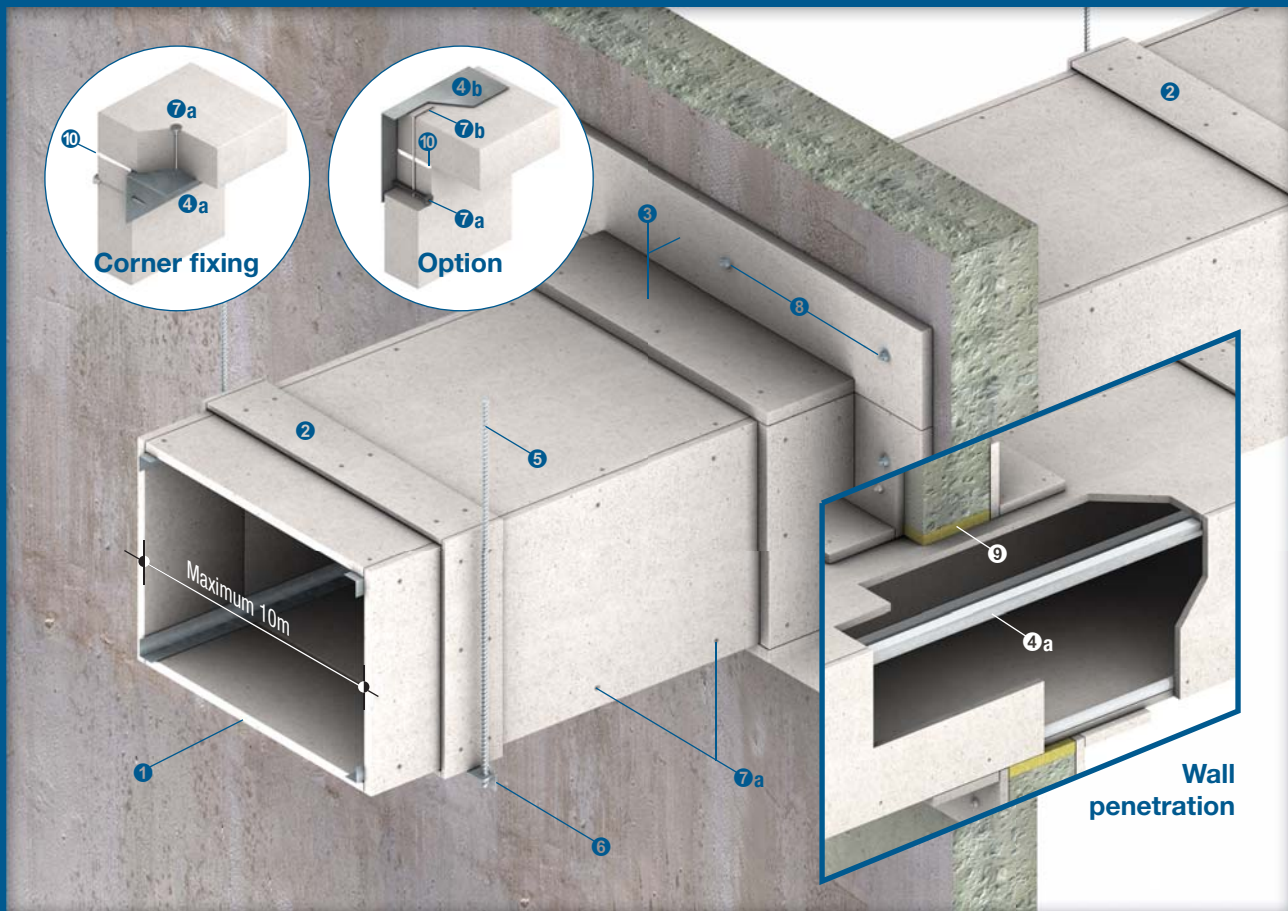
⁽¹⁾ Please consult Promat for allocation of the mineral wool

- ❹a Galvanised steel angles 30mm x 30mm x 0.6mm thick
- ❹b Galvanised steel angles 40mm x 20mm x 0.6mm thick

- ❺ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❼a No. 8 self-tapping screws at nominal 200mm centres
- ❼b Steel wire staples 63/10/2mm at nominal 150mm centres (not applicable for 12mm thick boards)
- ❽ M8 anchor bolts at nominal 500mm centres
- ❾ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- ❿ Fill all board joints with PROMASEAL®-A Acrylic Sealant

Selection of board thickness also depends on the internal cross section of the self-supporting duct and the operating pressure. See examples using PROMATECT®-L500 board on page 27 where internal stiffeners may be required for large to medium ducts with high operating pressure

The above self-supporting duct system is approved for up to 10000mm width x 3000mm height. For larger ducts, please consult Promat for variations on the supporting components

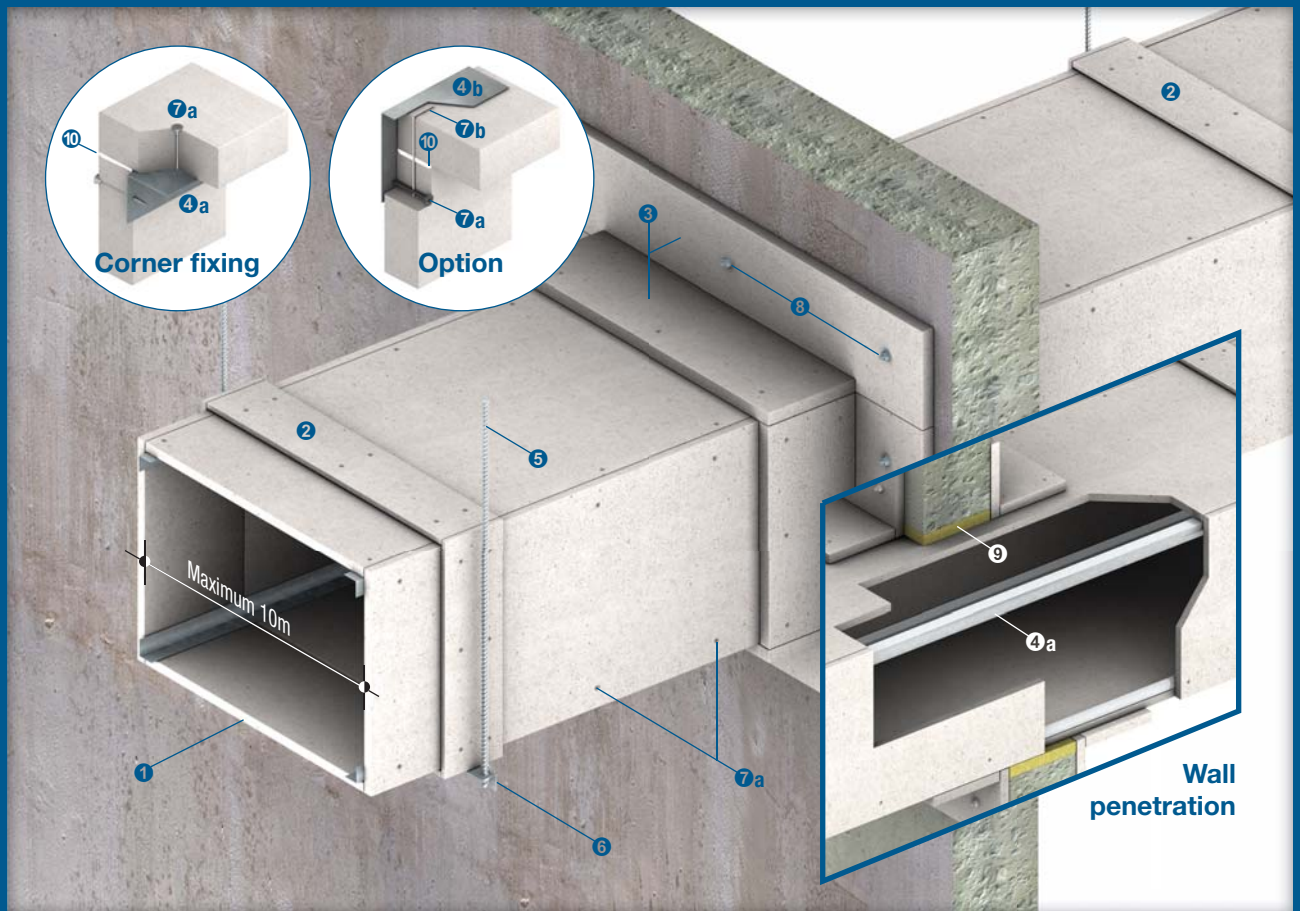


Up to 180/180/90 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and AS 1530: Part 4: 2005

- ❶ PROMATECT®-H board 20mm thick
- ❷ PROMATECT®-H cover strips 100mm wide x 20mm thick
- ❸ PROMATECT®-H collars 150mm wide x 20mm thick fitted around the duct on both sides of the wall forming an L shape
- ❹a Galvanised steel angles 30mm x 30mm x 0.6mm thick
- ❹b Galvanised steel angles 40mm x 20mm x 0.6mm thick
- ❺ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❼a No. 8 self-tapping screws at nominal 200mm centres
- ❼b Steel wire staples 63/10/2mm at nominal 150mm centres
- ❽ M8 anchor bolts at nominal 500mm centres
- ❾ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- ❿ Fill all board joints with PROMASEAL®-A Acrylic Sealant

Selection of board thickness also depends on the internal cross section of the self-supporting duct and the operating pressure. See examples using PROMATECT®-L500 board on page 27 where internal stiffeners may be required for large to medium ducts with high operating pressure

The above self-supporting duct system is approved for up to 10000mm width x 3000mm height. For larger ducts, please consult Promat for variations on the supporting components



Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- ❶ PROMATECT®-H board with or without mineral wool laid on surface of the board, requirements in accordance with table below
- ❷ PROMATECT®-H cover strips 100mm wide x 9mm thick (except 20mm thick for 240/240/30 fire resistance when using 20mm thick of ❶)
- ❸ PROMATECT®-H collars 150mm wide, thickness in accordance with table below, fitted around the duct on both sides of the wall forming an L shape

Fire resistance	Board/collar thickness	Mineral wool thickness x density
240/240/30	25mm / 20mm	Not required
240/240/240	25mm	100mm x 140kg/m ³ ⁽¹⁾

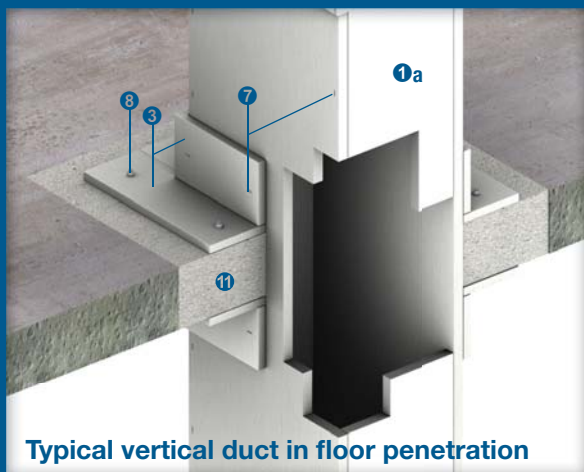
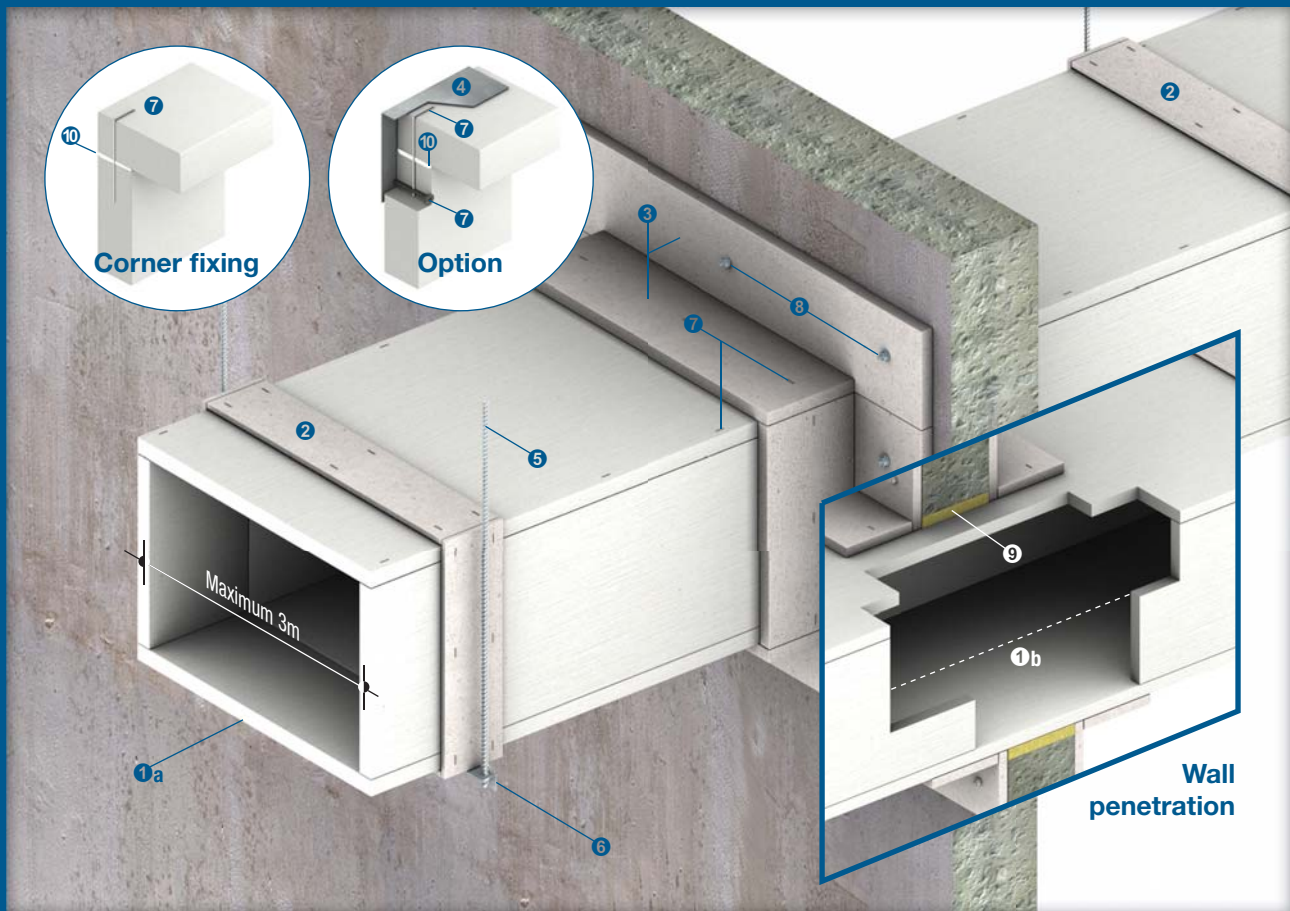
⁽¹⁾ Please consult Promat for allocation of the mineral wool

- ❹a Galvanised steel angles 30mm x 30mm x 0.6mm thick
- ❹b Galvanised steel angles 40mm x 20mm x 0.6mm thick

- ❺ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❼a No. 8 self-tapping screws at nominal 200mm centres
- ❼b Steel wire staples 63/10/2mm at nominal 150mm centres
- ❽ M8 anchor bolts at nominal 500mm centres
- ❾ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- ❿ Fill all board joints with PROMASEAL®-A Acrylic Sealant

Selection of board thickness also depends on the internal cross section of the self-supporting duct and the operating pressure. See examples using PROMATECT®-L500 board on page 27 where internal stiffeners may be required for large to medium ducts with high operating pressure

The above self-supporting duct system is approved for up to 10000mm width x 3000mm height. For larger ducts, please consult Promat for variations on the supporting components



Typical vertical duct in floor penetration

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987 and/or AS 1530: Part 4: 2005

- 1a PROMATECT®-L500 board, thickness in accordance with the table on page 27
- 1b Guideline to PROMATECT®-L500 internal stiffeners, options in accordance with the table on page 27
- 2 PROMATECT®-H cover strips 100mm wide x 9mm thick

- 3 PROMATECT®-L500 collars minimum 80mm wide or 400mm wide⁽¹⁾, thickness in accordance with the table on page 27 fitted around the duct on both sides of the wall forming an L shape
- 4 Galvanised steel angles 40mm x 20mm x 0.6mm thick
- 5 Steel rod hangers (see page 3 for maximum stress allowance calculation)
- 6 Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- 7 Fixings in accordance with the below table. Care should be taken not to overtighten the screws. When edge fixing it is advisable to drill pilot holes

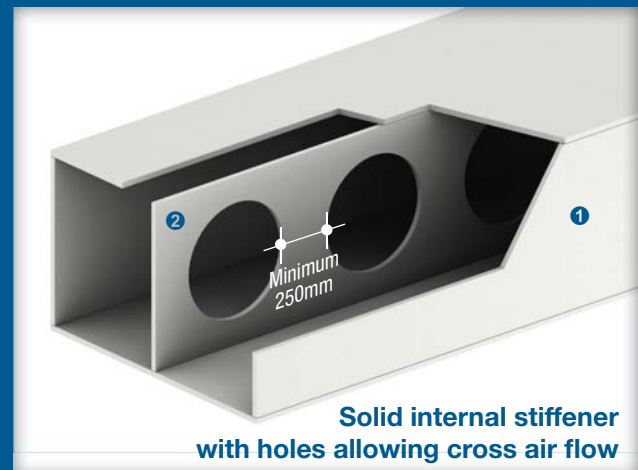
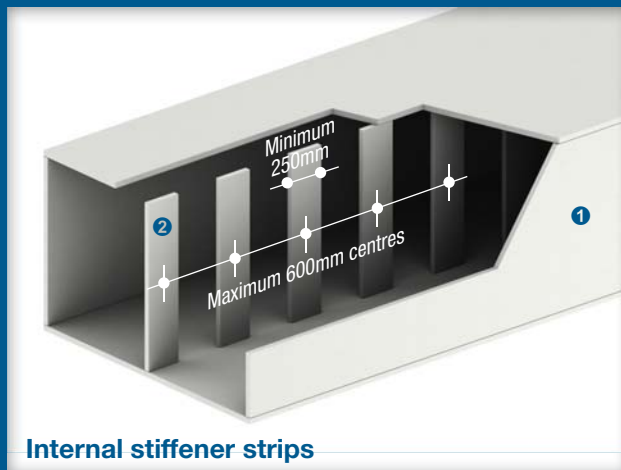
Board thickness	Deep threaded drywall screws preferably with ribbed heads at 200mm centres	Steel wire staples at 100mm centres
25mm	No.6 x 50mm	63/11/1.5mm
35mm	No.8 x 63mm	70/12/2mm
40mm	No.8 x 75mm	80/12/2mm
50mm or 52mm	No.10 x 100mm	90/12.2/2.3mm

For further guidance on steel wire staple fixing, please consult Promat

- 8 M8 anchor bolts at nominal 500mm centres
- 9 Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- 10 Fill all board joints with PROMASEAL®-A Acrylic Sealant
- 11 Seal penetration gaps with PROMASTOP® Cement or PROMASEAL® Mortar

Selection of board thickness also depends on the internal cross section of the self-supporting duct. See examples on page 27 where internal stiffeners may be required for large to medium ducts with high operating pressure

The above self-supporting duct system is approved for up to 3000mm width x 1250mm height. For larger ducts, please consult Promat for variations on the supporting components

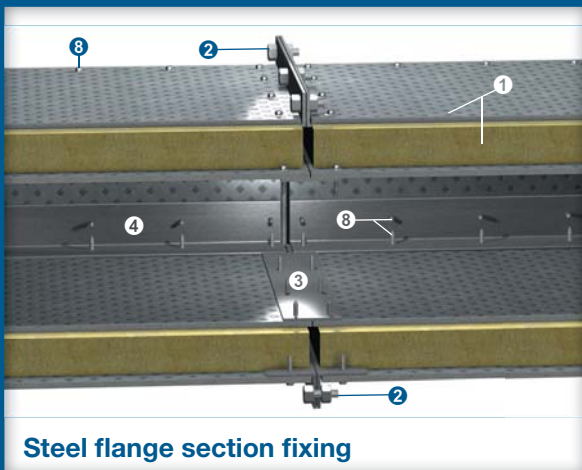
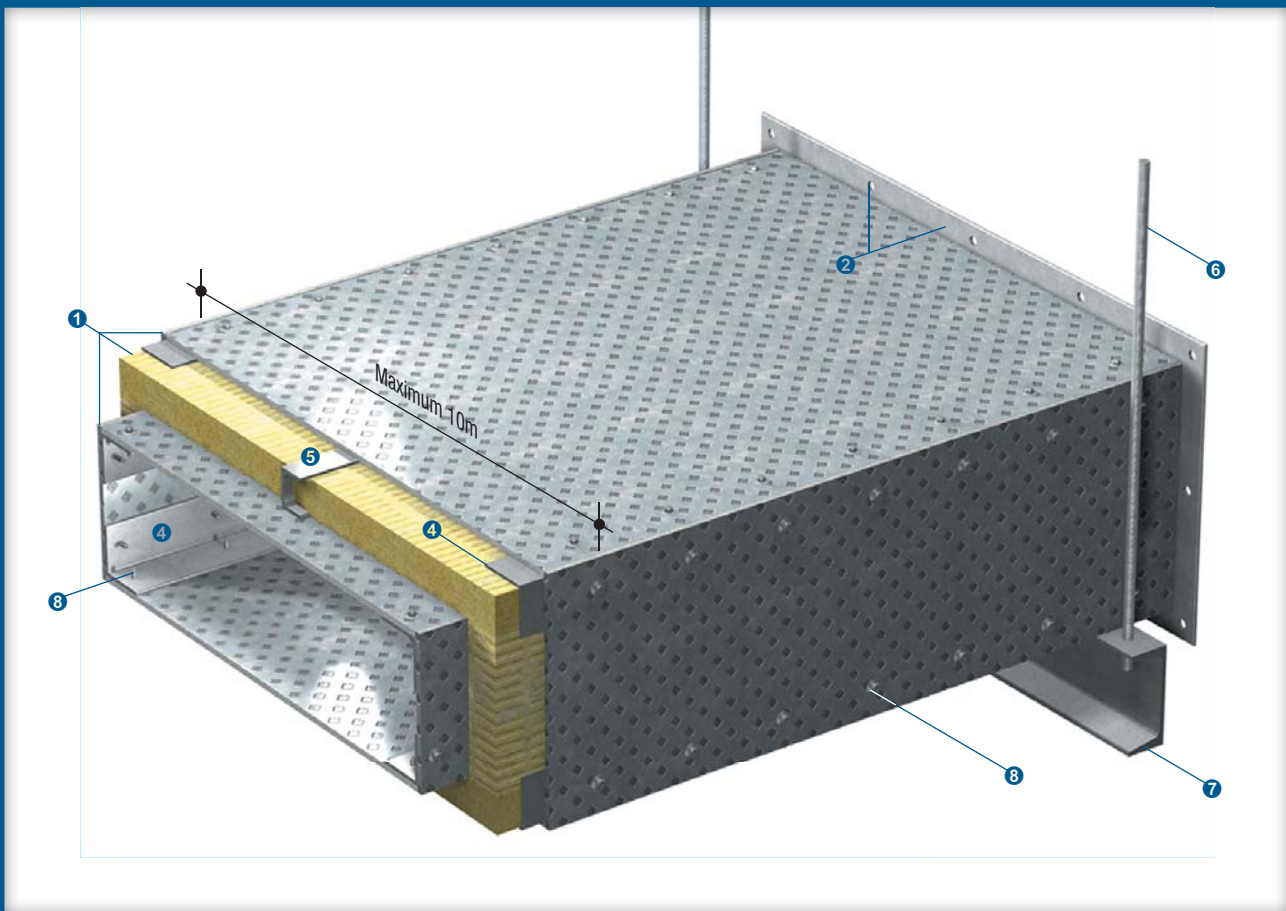


- ① PROMATECT®-L500 board, thickness in accordance with table below
- ② PROMATECT®-L500 internal stiffeners, options in accordance with table below

Duct type	Maximum operating pressure	Fire resistance	Board/collar thickness	Internal stiffener minimum size by duct height		Maximum duct size width x height
				Continuous strips at maximum 600mm centres	Solid piece with die cut holes by duct length	
Type A exposed to external fire	± 500Pa	30/30/30	25mm	Not required		1200mm x 1200mm or 3000mm x 1250mm
		60/60/60	25mm	Not required		
		90/90/90	25mm	Not required		
		120/120/120	25mm	Not required		
	± 750Pa	30/30/30	40mm	Not required		1200mm x 1200mm, 2000mm x 1250mm or 3000mm x 1250mm
		60/60/60	40mm	Not required		
		90/90/90	40mm	Not required		
		120/120/120	40mm	Not required		
	± 1000Pa to - 2000Pa	30/30/30	40mm	Two rows of 250mm wide x 40mm thick	Two rows of 40mm thick	800mm x 600mm, 1800mm x 600mm or 1440mm x 700mm
		60/60/60	40mm	Not applicable	1 row of 40mm thick	
		90/90/90	40mm	Not applicable	1 row of 40mm thick	
		120/120/120	40mm	Not applicable	1 row of 40mm thick	
Type B exposed to internal fire	± 500Pa	30/30/30	25mm	Not required		1200mm x 1200mm or 3000mm x 1250mm
		60/60/60	35mm	Not required		
		240/240/30	25mm	Not required		
	± 750Pa	30/30/30	40mm	Not required		1200mm x 1200mm, 2000mm x 1250mm or 3000mm x 1250mm
		60/60/60	40mm	Not required		
		90/90/90	40mm	Not required		
	± 1000Pa to - 2000Pa	240/240/30	40mm	One row of 250mm wide x 40mm thick	1 row of 40mm thick	800mm x 600mm, 1800mm x 600mm or 1440mm x 700mm
		30/30/30	40mm	Not applicable	1 row of 40mm thick	
		60/60/60	40mm	Not applicable	1 row of 40mm thick	
		90/90/90	40mm	Not applicable	1 row of 40mm thick	
		120/120/120	52mm ⁽¹⁾	Not applicable	1 row of 40mm thick	
	240/240/240	52mm ⁽²⁾	Two rows of 250mm wide x 40mm thick	Not applicable		

⁽¹⁾ Tested to AS 1530: Part 4: 2005 using PROMATECT®-L500 collars 400mm wide x 52mm thick

⁽²⁾ Constructed with one layer of mineral wool 50mm thick x 100kg/m³ (Duct Type B only). Please consult Promat for allocation of the mineral wool



Steel flange section fixing

Up to 120/120/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① One or two layers of PROMATECT®-S board and/or mineral wool, specification in accordance with table at top right
- ② Continuous steel flange sections, fabricated by cut and welded galvanised steel angles 50mm x 50mm x 3mm thick bolted together with M10 nuts and bolts at nominal 200mm centres

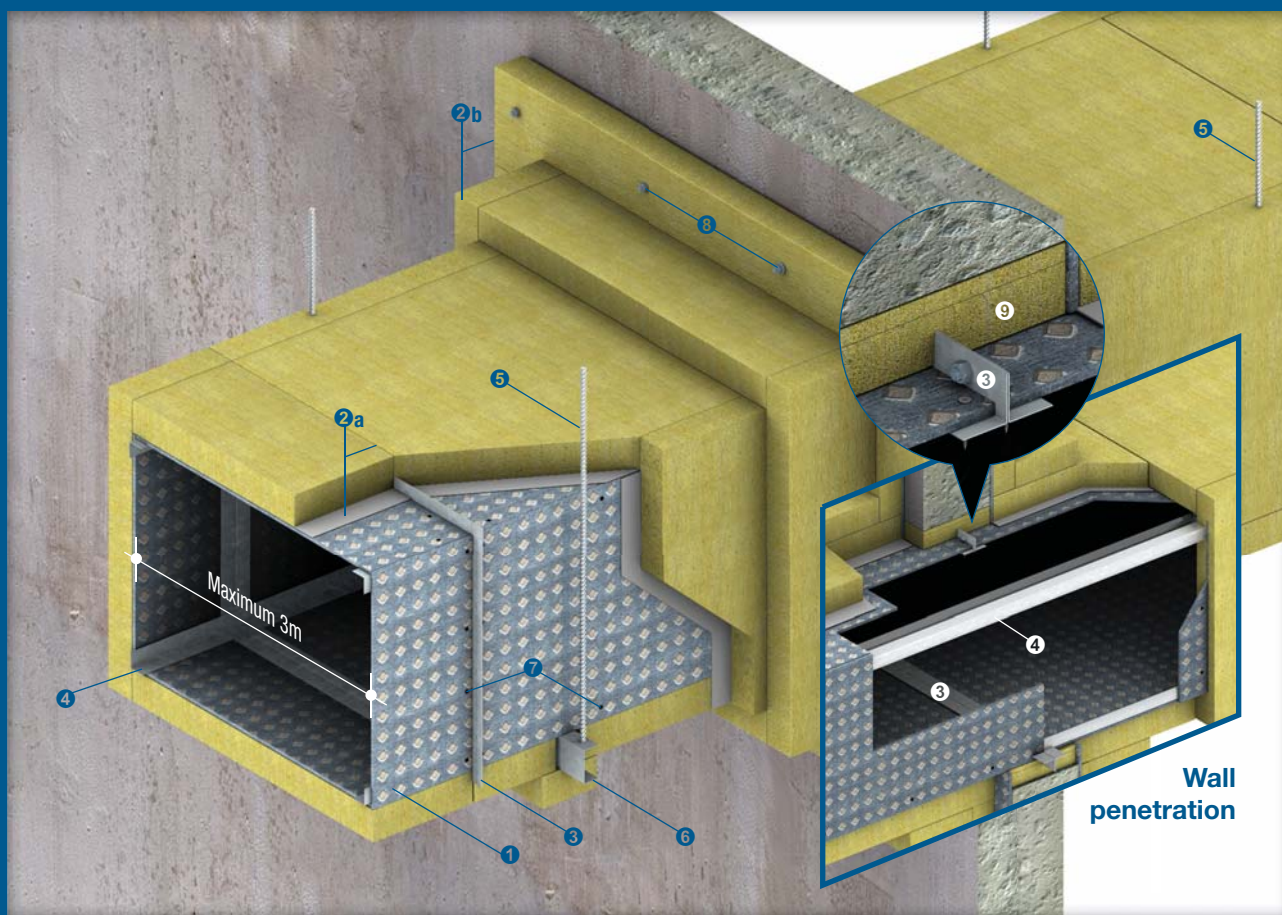
Where the duct penetrates the wall substrate, PROMATECT®-S collars 100mm wide x 6mm thick should be fitted around the duct on both sides of the wall forming an L shape

The above self-supporting duct system is approved for up to 10000mm width x 4000mm height. For larger ducts, please consult Promat for variations on the supporting components

Alternatively, standard steel flange systems can be utilised for the required fire resistance performance. Please consult Promat for construction details

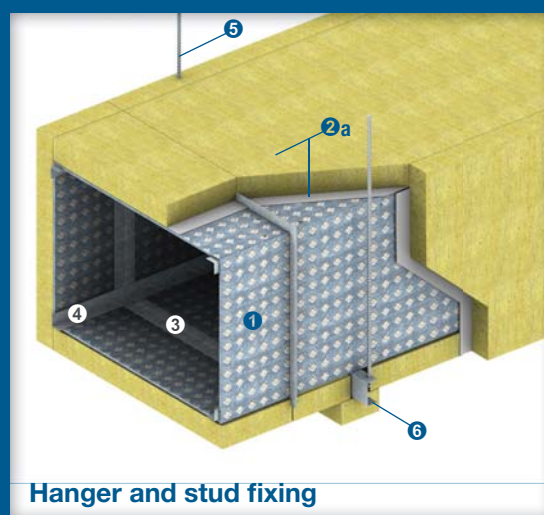
Fire resistance	Board thickness	Mineral wool
120/120/-	6mm	Not required
120/120/60	Two layers of 6mm	Please consult Promat for thickness and density of the mineral wool
120/120/120	Two layers of 6mm	Please consult Promat for thickness and density of the mineral wool

- ③ Galvanised steel flat bars 100mm x 3mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 3mm thick for corner reinforcement purposes. No mechanical fixing to item ② required
- ⑤ Galvanised steel channel 50mm x 3mm at middle span of the duct, thickness in accordance with the mineral wool where required
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧ 35mm x 5.5mm self-tapping Tek screws at nominal 200mm centres



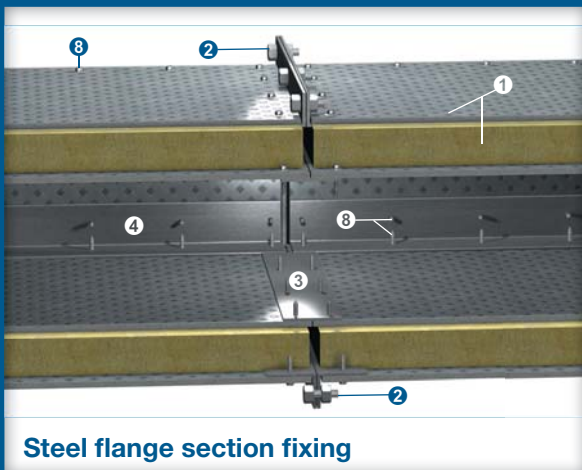
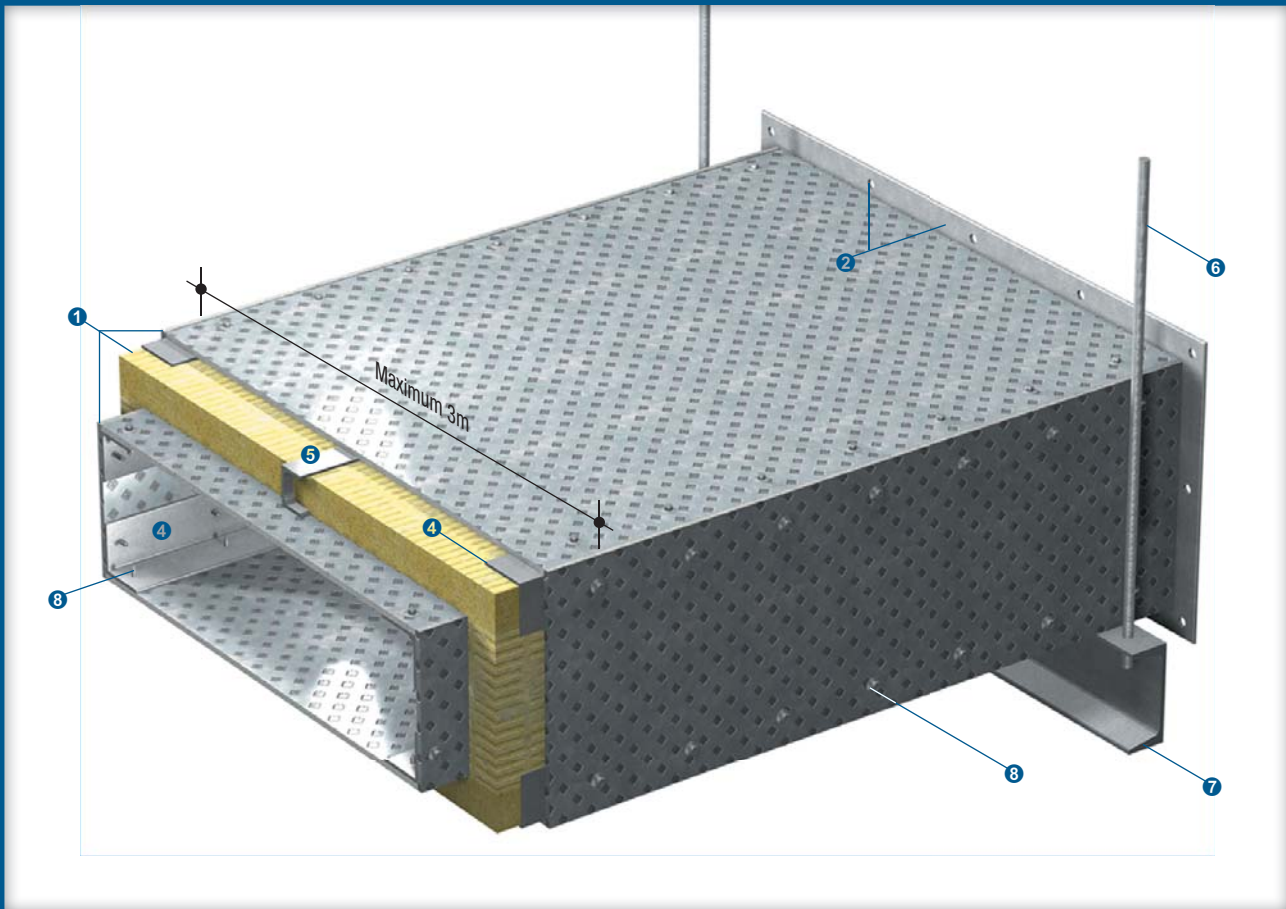
Up to 180/180/120 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ❶ PROMATECT®-S board 6mm thick
- ❷a Mineral wool bonded to surface of PROMATECT®-S board using VICUBOND® WR adhesive and fastened with welded steel pins
- ❷b Mineral wool 200mm wide x 50mm thick fitted around the duct (on top of ❷a) and both sides of the wall forming an L shape
- ❸ Continuous steel flange sections, fabricated by cut and welded galvanised steel angles 50mm x 50mm x 3mm thick bolted together with M12 nuts and bolts at nominal 250mm centres
- ❹ Galvanised steel angles 50mm x 50mm x 3mm, not fixed to the flanges
- ❺ Steel rod hangers of 15mm diameter (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❼ 35mm x 5.5mm self-tapping Tek screws at nominal 200mm centres at corners and board joints



- ❸ M6 anchor bolts at nominal 500mm centres
- ❹ Mineral wool 60kg/m³ tightly packed into aperture between substrate and surface of the mild steel ventilation duct

Please consult Promat for thickness and density of the mineral wool (❷a and ❷b). The above self-supporting duct system is approved for up to 3000mm width x 1500mm height. For larger ducts, please consult Promat for variations on the supporting components



Steel flange section fixing

Up to 180/180/180 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① PROMATECT®-S board 9.5mm thick with mineral wool

Please consult Promat for thickness and density of the mineral wool

- ② Continuous steel flange sections, fabricated by cut and welded galvanized steel angles 50mm x 50mm x 3mm thick bolted together with M10 nuts and bolts at nominal 200mm centres

Alternatively, standard steel flange systems can be utilised for the required fire resistance performance. Please consult Promat for construction details

- ③ Galvanized steel flat bars 100mm x 3mm thick coinciding with board joints

- ④ Galvanized steel angles 50mm x 50mm x 3mm thick for corner reinforcement purposes. No mechanical fixing required

- ⑤ Galvanized steel channel 50mm x 3mm at middle span of the duct, thickness in accordance with the mineral wool where required

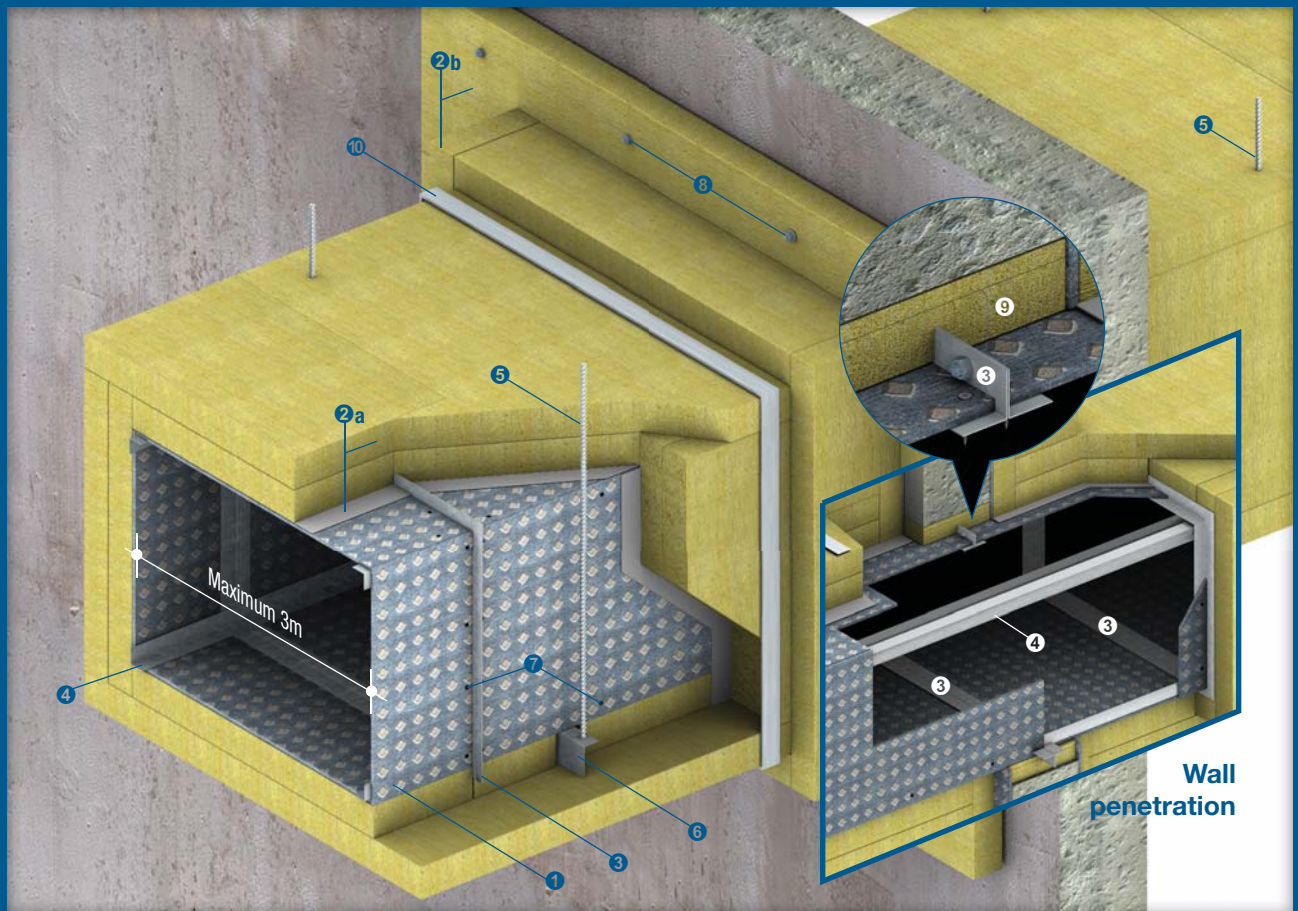
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)

- ⑦ Galvanized steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)

- ⑧ 35mm x 5.5mm self-tapping Tek screws at nominal 200mm centres

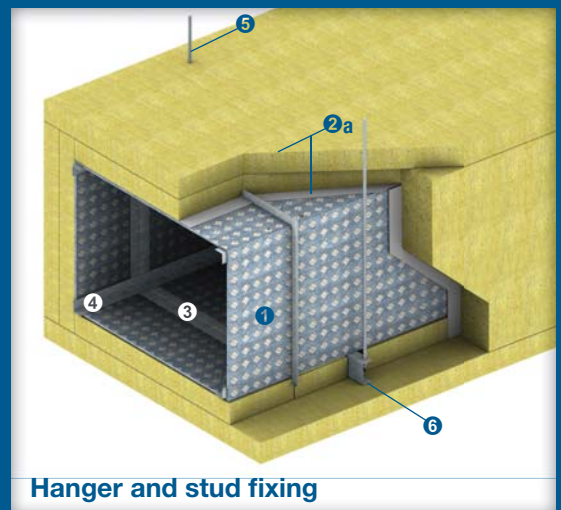
Where the duct penetrates the wall substrate, PROMATECT®-S collars 100mm wide x 9.5mm thick should be fitted around the duct on both sides of the wall forming an L shape

The above self-supporting duct system is approved for up to 3000mm width x 1500mm height. For larger ducts, please consult Promat for variations on the supporting components



Up to 240/240/180 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

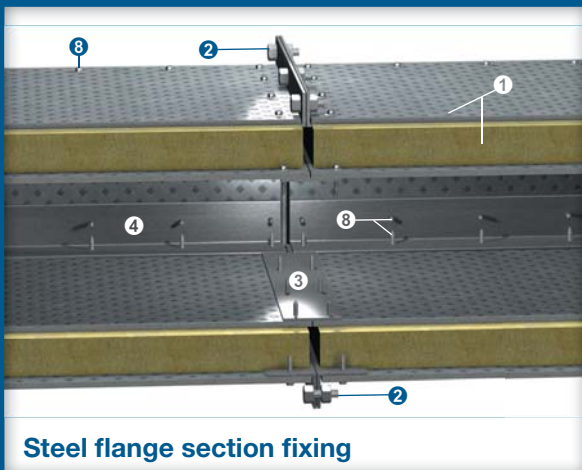
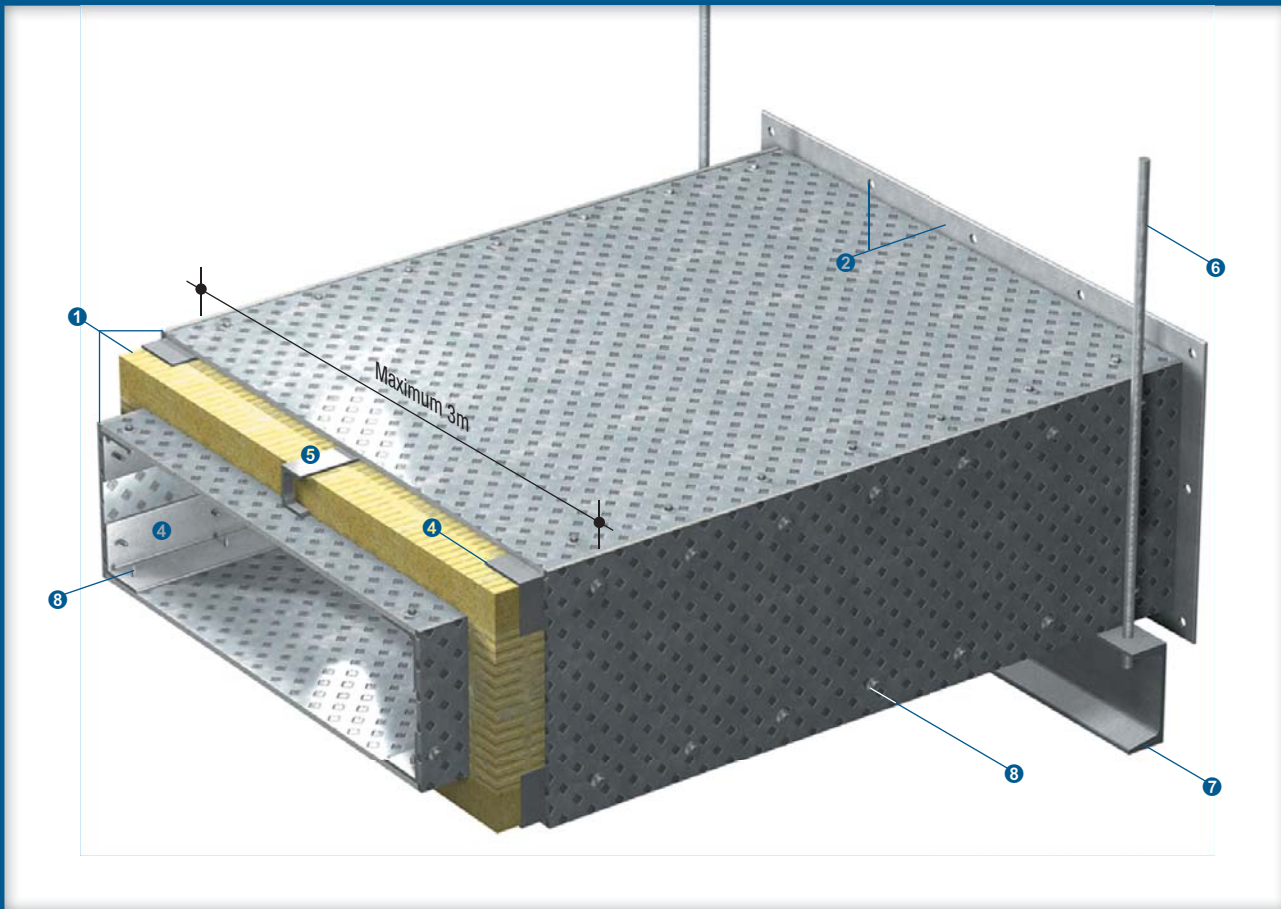
- ❶ PROMATECT®-S board 9.5mm thick
- ❷a Two layers of mineral wool bonded to surface of PROMATECT®-S board using VICUBOND® WR adhesive, and fastened with steel welded pins and washers in a grid of 300mm x 300mm
- ❷b Mineral wool 200mm wide x 50mm thick fitted around the duct (on top of ❷a) and both sides of the wall forming an L shape
- ❸ Continuous steel flange sections, fabricated by cut and welded galvanised steel angles 50mm x 50mm x 3mm thick bolted together with M12 nuts and bolts at nominal 250mm centres
- ❹ Galvanised steel angles 50mm x 50mm x 3mm, not fixed to the flanges
- ❺ Steel rod hangers of 15mm diameter (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ❼ 35mm x 5.5mm self-tapping Tekes screws at nominal 200mm centres at corners and board joints



Hanger and stud fixing

- ❸ M6 anchor bolts at nominal 500mm centres
- ❹ Mineral wool 140kg/m³ tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- ❷ Galvanised steel strap around outer layer of ❷a, two straps per 1200mm duct length and positioned 150mm from ❸

Please consult Promat for thickness and density of the mineral wool (❷a and ❷b). The above self-supporting duct system is approved for up to 3000mm width x 1500mm height. For larger ducts, please consult Promat for variations on the supporting components



Steel flange section fixing

Up to 240/240/240 fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ① One or two layers of PROMATECT®-S board and/or mineral wool, specification in accordance with table at top right
- ② Continuous steel flange sections, fabricated by cut and welded galvanised steel angles 50mm x 50mm x 3mm thick bolted together with M10 nuts and bolts at nominal 200mm centres

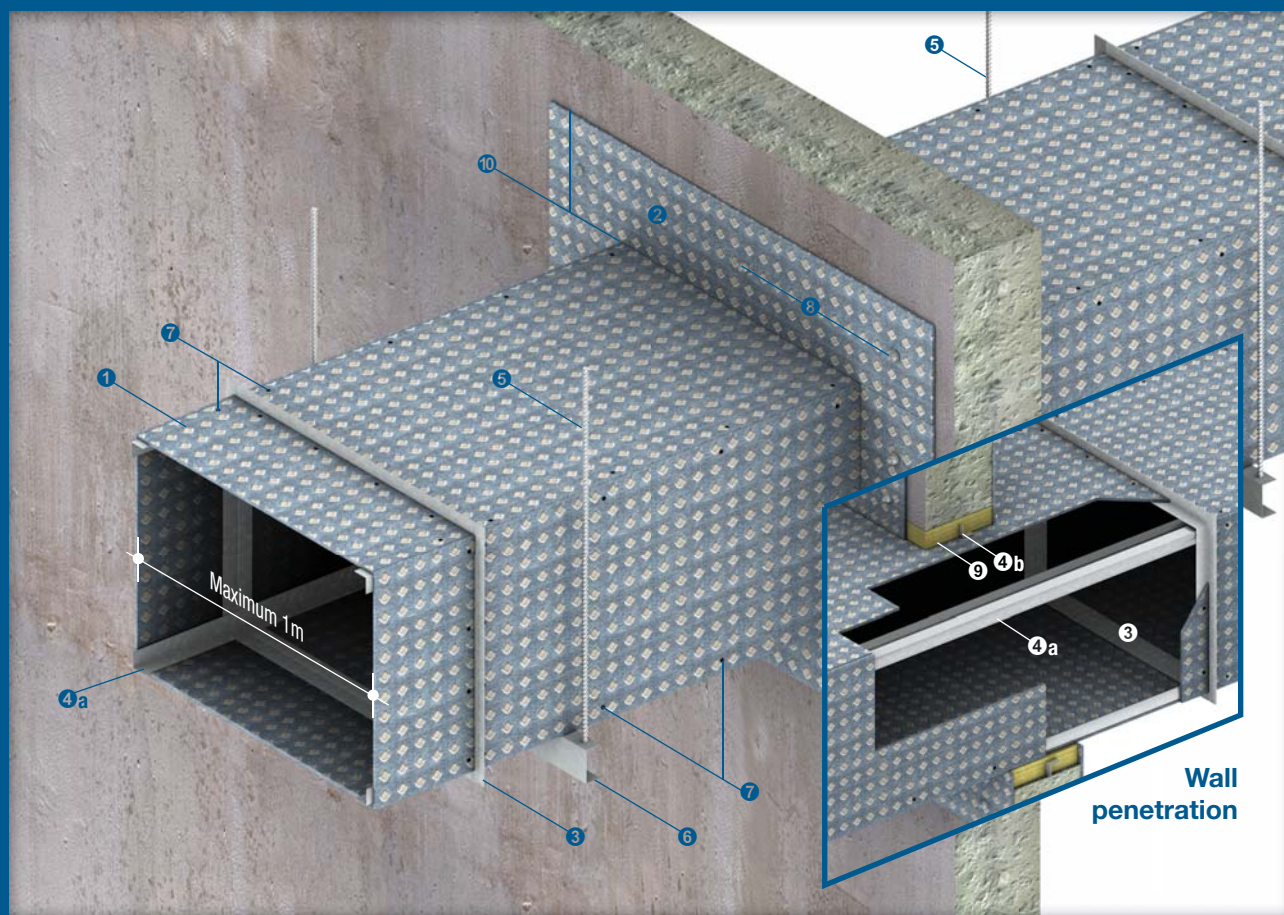
Where the duct penetrates the wall substrate, PROMATECT®-S collars 100mm wide x 9.5mm thick should be fitted around the duct on both sides of the wall forming an L shape

The above self-supporting duct system is approved for up to 10000mm width x 4000mm height. For larger ducts, please consult Promat for variations on the supporting components

Alternatively, standard steel flange systems can be utilised for the required fire resistance performance. Please consult Promat for construction details

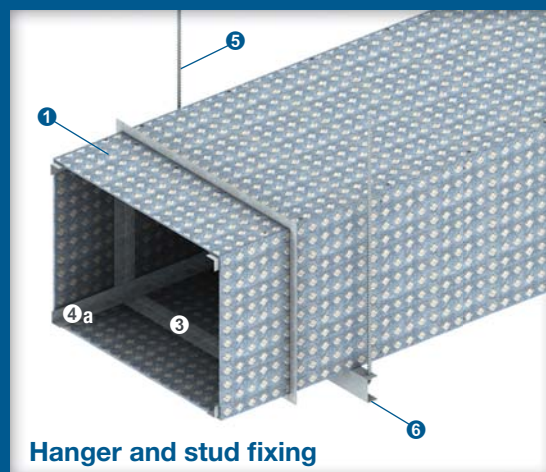
Fire resistance	Board thickness	Mineral wool
240/240/-	9.5mm	Not required
240/240/120	Two layers of 9.5mm	Please consult Promat for thickness and density of the mineral wool
240/240/180	Two layers of 9.5mm	
240/240/240	9.5mm	Please consult Promat for thickness and density of the mineral wool

- ③ Galvanised steel flat bars 100mm x 3mm thick coinciding with board joints
- ④ Galvanised steel angles 50mm x 50mm x 3mm thick for corner reinforcement purposes. No mechanical fixing required
- ⑤ Galvanised steel channel 50mm x 3mm at middle span of the duct, thickness in accordance with the mineral wool where required
- ⑥ Steel rod hangers (see page 3 for maximum stress allowance calculation)
- ⑦ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)
- ⑧ 35mm x 5.5mm self-tapping Teks screws at nominal 200mm centres



Up to 360/360/- fire resistance in accordance with the requirements of BS 476: Part 24: 1987

- ❶ PROMATECT®-S board 6mm thick
- ❷ PROMATECT®-S collars 100mm wide x 6mm thick fitted on both sides of the wall
- ❸ Continuous steel flange sections, fabricated by cut and welded galvanized steel angles 50mm x 50mm x 3mm thick bolted together with M12 nuts and bolts at nominal 200mm centres
- ❹a Galvanised steel angles 50mm x 50mm x 3mm, not fixed to the flanges
- ❹b Galvanised steel angles 50mm x 50mm x 3mm, fixed to the top section of the duct and positioned in the wall thickness within the penetration to act as a stiffener
- ❺ Steel rod hangers of 15mm diameter (see page 3 for maximum stress allowance calculation)
- ❻ Galvanised steel channel or angle (see page 3 for size calculation in accordance with weight and dimension of the duct and maximum stress allowance of the hangers)



- ❼ 35mm x 5.5mm self-tapping Tek screws at nominal 150mm centres at corners and board joints
- ❽ M6 anchor bolts at nominal 500mm centres
- ❾ Mineral wool tightly packed into aperture between substrate and surface of the mild steel ventilation duct
- ❿ Fill all board joints with PROMASEAL®-A Acrylic Sealant

The above self-supporting duct system is approved for up to 1000mm width x 250mm height. For larger ducts, please consult Promat for variations on the supporting components

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

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