Promat

Ventilation &
smoke extraction

PROMATECT®-H

Fire resistant cladding to steel ducts

Technical manual

Malaysia version

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etex inspiring ways of living

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THE EXPERTS IN PASSIVE FIRE PROTECTION & HIGH-PERFORMANCE INSULATION

We leave nothing to chance

Promat is the expert and worldwide reference in passive fire protection and high-performance insulation for the construction sector and a large number of industrial markets. We offer sustainable solutions that protect lives and assets, enhance comfort, optimise process efficiency, minimise the loss of space and energy and help reduce CO2 emissions.

Construction

Applications

- Tunnels
- Structural protection (steel, concrete, timber & composite structures)
- Compartmentation (wall, floor and ceiling structures)
- Fire stopping
- Ventilation and smoke extraction ducts

Industry

Markets

- Energy, Oil & Gas
- Fire Rated Components & Thermal Appliances
- Heavy Industry
- Transportation

A solution for every fireproofing or thermal problem

All our solutions and systems are backed by more than 60 years of experience and know-how. For each project we can rely on our extended, proven and certified range of calcium silicate, microporous and intumescent materials, and cementitious sprays. We make sure we always find the right solution for your fireproofing or thermal problem.

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OUR EXPERTISE

60 years of hard work and dedication have given Promat a lead in the domain of passive fire protection. We have developed unique ways to design our products, test them in real life conditions and to predict their behaviour in the event of fire.

Promaxon® technology

Our Promaxon® technology explains the unique qualities of our PROMATECT® Fire boards. We have selected and processed the raw materials until we have discovered **a unique, patented formula**. Through our exclusive engineered mineral matrix structure, PROMAXON® creates a unique, cotrolled small pore size calcium silicate mix with amasing qualities. This allows us to develop boards with excatly the right density and stability they need to withstand extreme heat conditions.

Promat Fire Testing methods

At the Promat Research and Technology Center, we perform more than 200 fire tests a year to guarantee our products and systems will comply with the most stringent international standards and regulations. Our fire test lab methods go beyond what is regulatory demanded and **replicate the real-life context** where our products can be installed. When a Promat product passes the fire test, it gets an official certificate that guarantees supreme performance.

Promat fire safety engineering

Our fire safety engineers have developed a revolutionary new approach, called **performance based fire safety design.** This new method not only complies with the protective measures as prescribed in fire safety regulations, it explains why the measures are needed. The fire safety engineer delivers an exact risk assessment through the combination of detailed calulations and supportive fire test reports. The technical fire protection report delivers the calculated proof that the building has all the protection installed to offer its designer full peace of mind.

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Smoke extraction and ventilation ducts

Get rid of smoke and slow down the development of fire

Smoke is often the main reason why people become victim of fire. When smoke and toxic gasses fill the space, it reduces not only the visibility, but also the amount of breathable air and leads to suffocation. Smoke is also a main factor in the spreading of fire. This is why a ducting system for smoke extraction is a key factor in your protection design.

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Promat offers a wide range of solutions for both ventilation and smoke extraction – for different operating pressures, sizes, orientations, configurations, and even for partial fire exposures. The solutions developed by our technical experts can meet any fire resistance requirement from 30 minutes (E – or EI 30) up to 120 minutes (E – EI 120), including smoke leakage (S). For special cases of 240-minute integrity and insulation solutions are also available.

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Fire Curve For Fire Resistance Tests

The fire resistance performance of a specimen of an element of building construction varies. It depends on the ability of the system to withstand exposure to defined heating and pressure conditions. The defined heating condition refers to recognised temperature/time fire curves (Figure 1).

Fire curves are the simplest hypothesis accurately representing a fire by predefined temperature and time relationships. Fire curves have evolved historically for fire resistance furnace tests of building materials and elements of construction for classification and verification.

Fire curves recognised by national and international standards organisations are as follows:

1. Standard Cellulosic Time-Temperature Curve

This fire curve covers the basic scenario of a fire of general combustible items of building content and materials of construction. It is based on ISO parameters and is used with – in some cases minor modications – in test standards throughout the world, including AS 1530: Part 4, ASTM E119, BS 476: Part 20, BS EN 1363: Part 1, DIN 4102: Part 2 and ISO 834: Part 1. It is a model of a ventilated controlled natural fire of general building materials and contents.

2. Hydrocarbon Curve

This curve is a simulation of a ventilated oil fire with a rapid temperature increase. The curve represents combustible hydrocarbons and is applicable where petroleum fires might occur, i.e. petrol or oil tanks, certain chemical facilities etc. In fact, although the hydrocarbon curve is based on a standardised type fire, there are numerous types of fire associated with petrochemical fuels which have wide variations in the duration of the fire, ranging from seconds to days.

3. Modified Hydrocarbon (HCM) Curve

As a result of French tunnel regulations for an enhanced version of the Hydrocarbon Curve, the maximum temperature of HCM is 1300°C, instead of the 1080°C benchmark of Standard Hydrocarbon Curve. However, the temperature gradient in the first few minutes of HCM fire is as severe as all other hydrocarbon based fires (e.g. RWS, HC), possibly causing thermal shock to the surrounding concrete structure and concrete spalling is a likely result.

4. RABT Curve

Developed in Germany as an outcome of a series of large scale test programmes such as the Eureka project. In the RABT curve (Richtlinien für die Ausstattung und den Betrieb von Straßentunneln or "Guideline for equipment and operation of road tunnels"), temperature rise is very rapid up to 1200°C, typically within 5 minutes. Duration of the 1200°C exposure is shorter than other curves with the temperature drop off starting to occur at 30 or 60 minutes.

5. RWS Curve

The curve was developed by Rijkswaterstaat (RWS), the Ministry of Transport in Netherlands. This model of a petroleum based fire of 300MW load fire in an enclosed space such as a tunnel, is often specified and internationally accepted for use in tunnels. Temperature increase is 1200°C at 5 minutes and after 30 minutes is 1300°C.

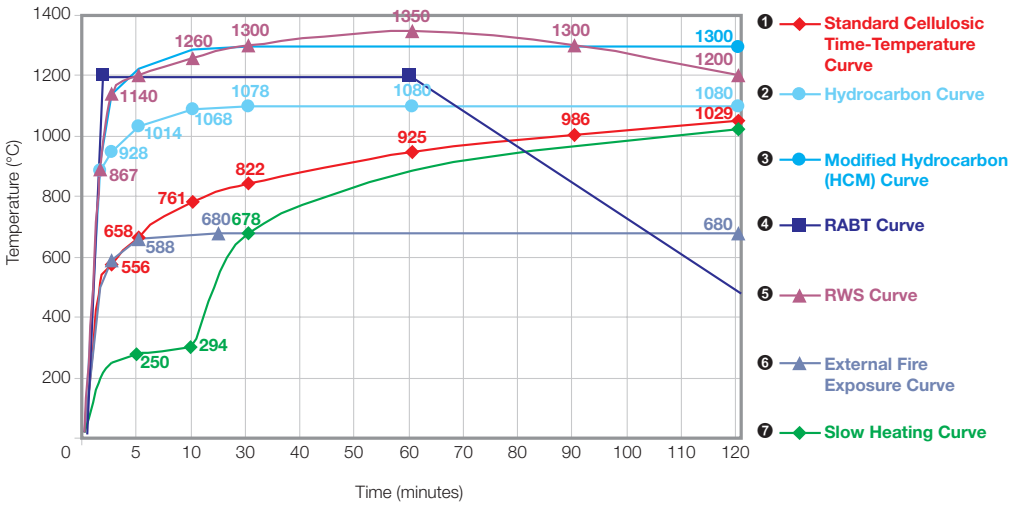
6. External Fire Exposure Curve

This model is for fire exposure external to a building and open to the atmosphere, where there are additional avenues for heat dissipation. There is a lower level of heat exposure, and the temperature increase is approximately 680°C after 20 minutes and remains constant throughout.

7. Slow Heating Curve

This curve simulates a slow growing fire. It is basically a combination of two curves, one for the first 21 minutes representing the smouldering effect of materials and one for subsequent periods representing the growth of the fire towards flashover.

Figure 1 Fire curves



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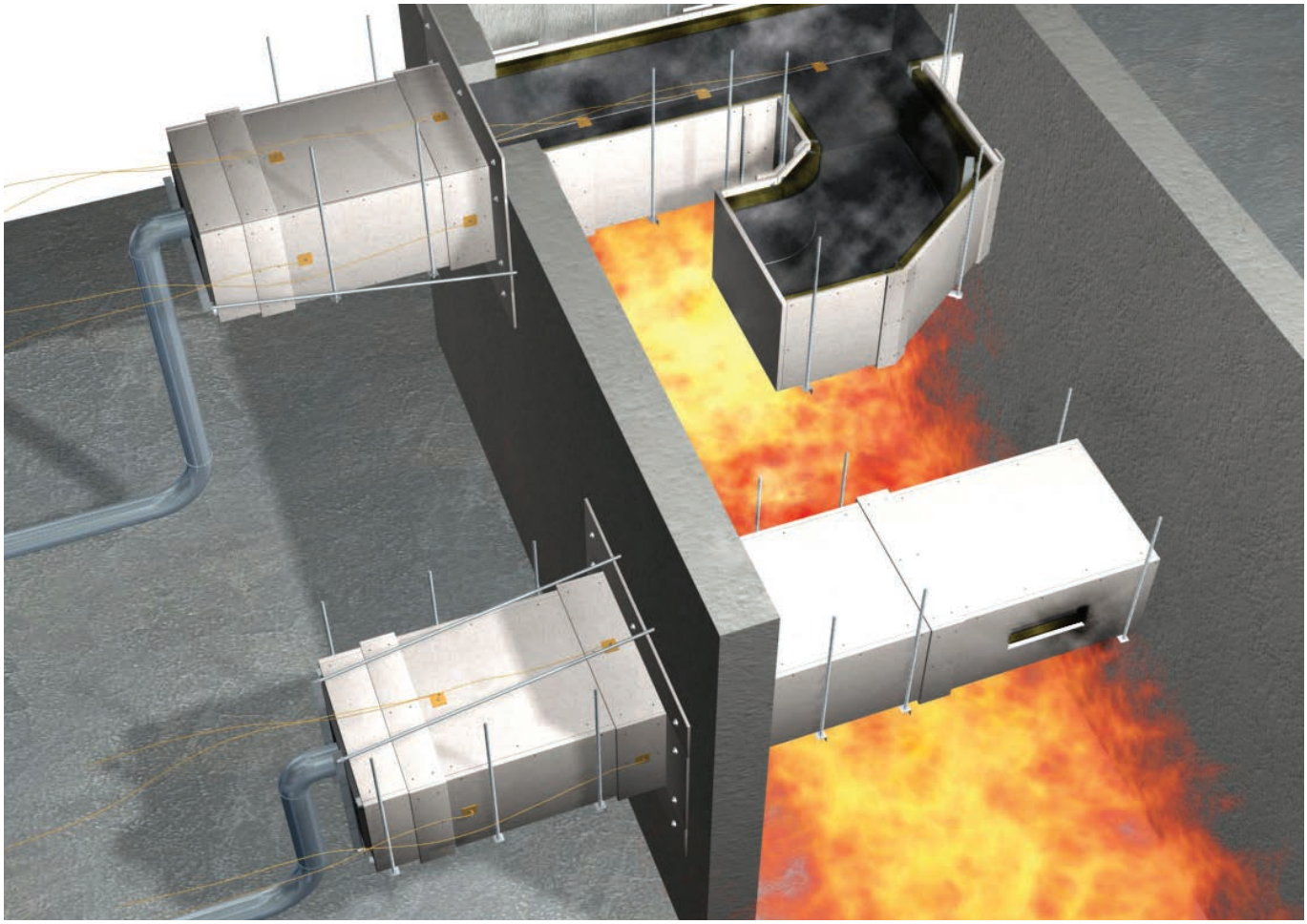
Fire Resistant Duct Test Standard – British Standard 476: Part 24

To determine the fire resistance of ducts (without the aid of fire dampers) passing through or between compartments, the system should normally be tested and assessed in accordance with British Standard BS 476: Part 24. These standards have been written specifically for ventilation ducts, but guidance is also given in these standards or the performance requirements for "smoke extract" 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 length of duct 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 to BS for a horizontal ducts, a run length of at least 3000mm is located within the fire compartment 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 criteria. 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 classified 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 extracts, 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). The requirement for kitchen extraction duct is in the Annex of the standard, and it is not mandatory. 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 fire resistant ducts meet this requirement up to 240 minutes performance.



Fire test for Duct Type A and Type B

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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 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 of 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. Penetrations 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. All 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.

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".

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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.

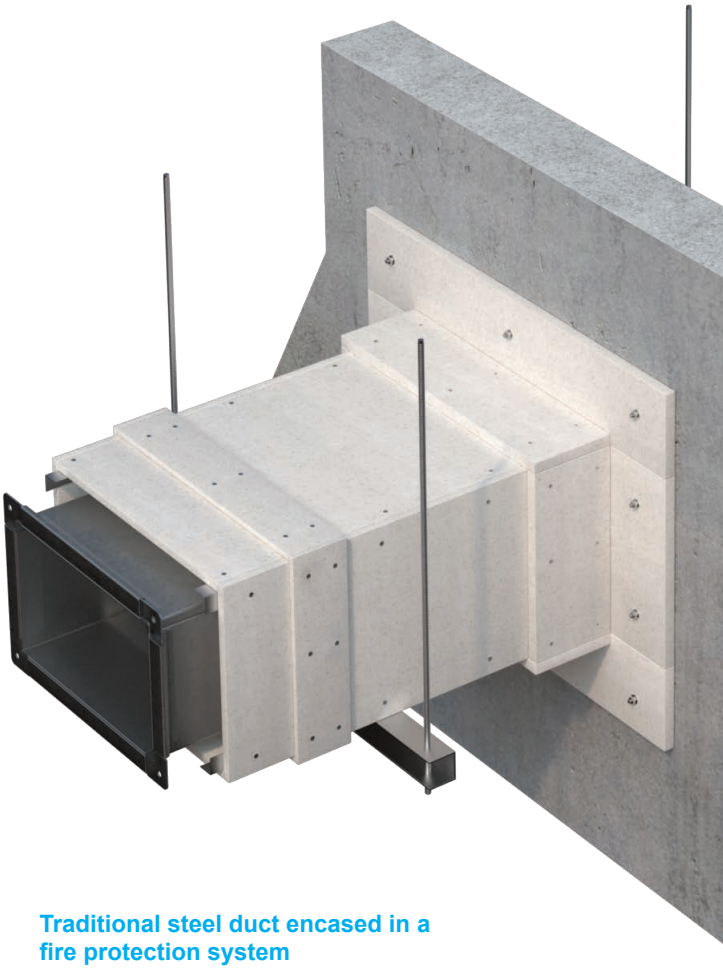
The stress reduction ratio factors below are based on BS EN 1993-1-2: 2005. Similar figures can be applied from AS/NZS 4600: 2005/Amendment 1: 2010.

Fire resistance period	Approximate temperature	Maximum permitted stress	Maximum permitted centres
30 minutes	840°C	18N/mm²	2500mm
60 minutes	950°C	10N/mm²	2500mm
90 minutes	1000°C	10N/mm²	2500mm
120 minutes	1050°C	10N/mm²	2500mm
180 minutes	1110°C	6N/mm²	2000mm
240 minutes	1150°C	6N/mm²	1500mm

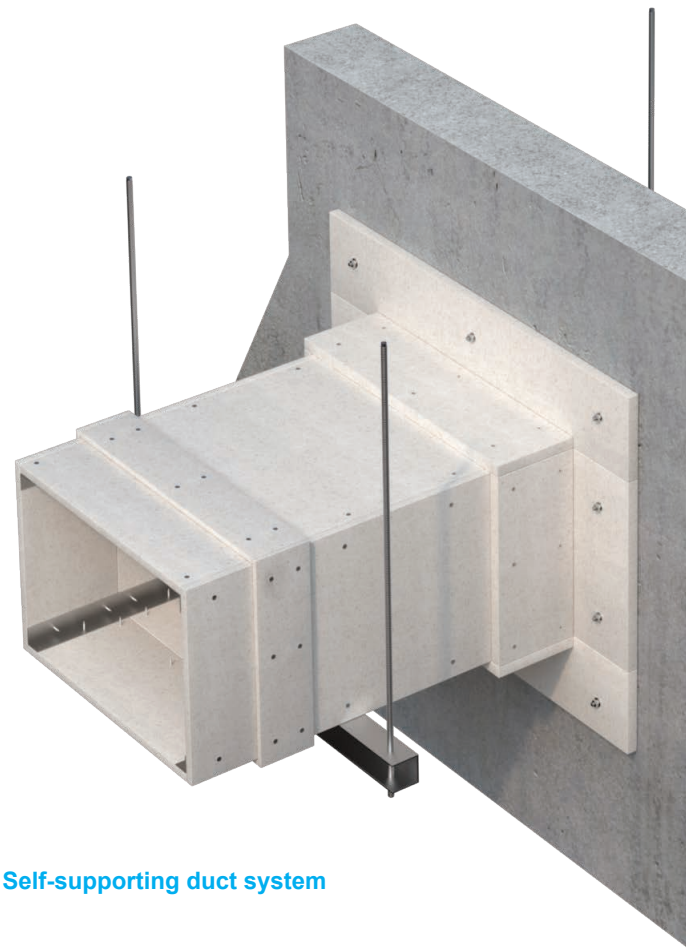
It should be noted that the stress levels referred to above apply to the threaded rod hanger supports themselves. The horizontal supporting members have a different level of applicable stress. The maximum centres refer to the greatest allowable distance between hanger support systems. However it should 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

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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 π x r² 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	20.10mm²
8mm	6.83mm	36.63mm²
10mm	8.60mm	58.08mm²
12mm	10.36mm	84.29mm²
14mm	12.25mm	117.85mm²
16mm	14.14mm	157.03mm²
18mm	15.90mm	198.55mm²
20mm	17.67mm	245.20mm²

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 = $\frac{F \text{ where } F = \text{force in Newtons}}{A \text{ where } A = \text{area of rod cross section}}$
= 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:

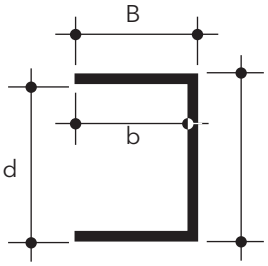
Board thickness = 12mm
Duct height = 1.0m
Duct width = 1.0m
Section length = 1.22m
Area of boards = (Width x 2) + (Height x 2) x Section length
Weight of boards = Area x Thickness x Density (975kg/m³)
Weight of angles = (Section length x 4) + (Width x 4) + (Height x 4) x 0.63kg/m
Section weight = 68.62kg 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:

Allowance stress, S (N/mm²) > $\frac{M \text{ where Z is the section modulus in cm}^3}{Z}$
Section modulus, Z > $\frac{M}{10}$
> 10.26cm³

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 = $\frac{B \times D^2}{6} - \frac{b \times d^2}{6}$ = 10.52cm³



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PROMATECT®-H

Fire protective construction board

Material properties	
General description	Calcium Silicate board made with Mineral Matrix Engineering technology
Surface condition & appearance	Off-white colour Front face: smooth Back face: sanded
Nominal dry density (average)	Approx. 975kg/m³
Moisture Content	Approx. 6.0% The moisture content varies and will reach an equilibrium over time with the atmospheric relative humidity of the environment
Alkalinity	pH 12
Thickness tolerance	Compliant with thickness tolerance of CE requirements (9mm thick standard sheets, +/-0.5mm)
Dimension tolerance	±5mm (standard board dimensions)

Product description

PROMATECT®-H is a non-combustible calcium silicate board manufactured under Promat's proprietary Mineral Matrix Engineering Technology. It does not contain formaldehyde or any asbestos. The product is dimensionally stable and resistant to the effects of moisture. Its performance characteristics are not degraded by moisture PROMATECT®-H has the following intended uses (according to EAD[1] 350142-00-1106): internal use (type Z2), internal use in high humidity conditions (type Z1) and external semi-exposed use (type Y). For fully exposed conditions, consult Promat Technical Department.

EAD[1]: European Assessment Document

Manufacturing Certification

PROMATECT®-H is manufactured under a quality management system certified in accordance with ISO 9001:2015. The manufacturing site is also certified to meet the environmental standards of ISO 14001:2015 and the occupational health & safety requirements of ISO 45001:2018.

Fire Resistant Applications

- → Structural steel fire protection
- → Internal drywalls
- → Internal lining to external walls
- → Suspended and self-supporting hanger free ceilings
- → Self-supporting airduct or cladding to steel sheet metal ducts
- → Enclosures to E&M services
- → Smoke screens
- → Flame barrier
- → Parapet & spandrel walls
- → Upgrading fire performance of
  - Reinforced concrete
  - Masonry construction

Static Values			
Modulus of Elasticity E	**Flexural Strength** F	**Tensile strength** T	**Compressive strength** ⊥
Longitudinal: 4.1kN/mm² Transverse: 4.0kN/mm²	Longitudinal: 10N/mm² Transverse: 7N/mm²	Longitudinal: 4.11N/mm² Transverse: 2.15N/mm²	9.3N/mm²

Reaction to Fire & Thermal Properties		
Combustibility	**Surface burning**	**Thermal conductivity**
A1 Classification: EN 13501-1 Non-combustible: BS 476: Part 4	Class O: BS 476: Part 6 & 7	0.242W/m°K

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PROMATECT®-H

Fire protective construction board

Standard thickness	Standard dimension	Number of boards per pallet	Surface area per pallet	Weight of standard sheet	Weight per pallet
9mm	2440mm x 1220mm	61	181.5m²	Approx. 29kg	Approx. 1,888kg
12mm	2440mm x 1220mm	46	136.9m²	Approx. 39kg	Approx. 1,896kg
15mm	2440mm x 1220mm	36	107.3m²	Approx. 49kg	Approx. 1,858kg
20mm	2440mm x 1220mm	27	80.4m²	Approx. 65kg	Approx. 1,859kg
25mm	2440mm x 1220mm	22	65.4m²	Approx. 82kg	Approx. 1,890kg

All physical and mechanical values are averages based on standard production and tested according to internal procedures. The typical values are given for guidance. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please consult Promat Technical Department.

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PROMATECT®H Fire Resistant Cladding to Steel Ducts based on BS 476: Part 24

BOMBA APPROVAL File No.: JBPM.IP.RNP: 700-7/2/19-46 (26)
Series No.: BB/DS/202/95 (P25)

System No.	Fire Resistance (minutes)				Duct A (external fire)		Duct B (internal & external fire)	
	Stability	Integrity	Insulation					
			Standard	Kitchen	PROMATECT®-H	Mineral wool	PROMATECT®-H	Mineral wool
Details in Report BRANZ FAR 4106-Issue 2								
1	60	60			9mm		9mm	60
2	120	120			9mm		9mm	120
3	240	240			12mm		12mm	240
4a	120	120	60	60	9mm	25mm x 80kg/m³	9mm	2 x 25mm x 80kg/m³
4b	120	120	60	60	12mm	25mm x 60kg/m³	12mm	2 x 25mm x 60kg/m³
5a	120	120	120	120 (1)	12mm	2 x 25mm x 100kg/m³	12mm	3 x 25mm x 60kg/m³ OR 50mm x 100kg/m³
5b	120	120	120	120 (1)	15mm	30mm x 1000kg/m³	15mm	2 x 25mm x 100kg/m³
6	240	240	240	240 (1)	25mm	2 x 50mm x 100kg/m³	25mm	2 x 50mm x 100kg/m³
Note (1) - Non-Mandatory Annex of BS 476: Part 24 not required for Kitchen Exhaust Duct.								
Details in Report BRE 282351 - Max Steel duct size 6m W x 2.5m H vertical & horizontal running								
1	240	240	240		25mm	100mm x 100kg/m³	25mm	100mm x 100kg/m³
2	240	240	30		25mm		25mm	
3	120	120	120		15mm	50mm x 50kg/m³		
4	120	120	30		20mm		20mm	
5	120	120	30		15mm		15mm	
Details in Report WF 178825-Issue 2 - Max Steel duct size 6m W x 2.5m H vertical & horizontal running								
1	60	60			9mm		9mm	
2	120	120			9mm		9mm	
3	240	240			12mm		12mm	
4	120	120			9mm		9mm	
4a	120	120	60		12mm	25mm x 50kg/m³	12mm	2 x 25mm x 50kg/m³
4b	120	120	60		12mm	25mm x 50kg/m³	12mm	2 x 25mm x 50kg/m³
5a	120	120	120		15mm	2 x 25mm x 100kg/m³	15mm	3 x 25mm x 100kg/m³
5b	120	120	120		15mm	30mm x 1000kg/m³	15mm	2 x 25mm x 100kg/m³
6	240	240	240		25mm	2 x 50mm x 100kg/m³	25mm	2 x 50mm x 100kg/m³
Details in Report WF 178825-Issue 2 - Max Steel duct size 6m W x 2.5m H vertical & horizontal for Kitchen Exhaust Ducts								
5a	120	120	30	30	12mm	2 x 25mm x 100kg/m³	12mm	2 x 25mm x 100kg/m³
5b	120	120	30	30	15mm	2 x 25mm x 100kg/m³	15mm	2 x 25mm x 100kg/m³
6	240	240	60	60	25mm	2 x 50mm x 100kg/m³	25mm	2 x 50mm x 100kg/m³
5b	120	120	120	120 (1)	15mm	2 x 25mm x 100kg/m³	15mm	2 x 25mm x 100kg/m³
6	240	240	240	240 (1)	25mm	2 x 50mm x 100kg/m³	25mm	2 x 50mm x 100kg/m³
Note (1) - Non-Mandatory Annex of BS 476: Part 24 not required for Kitchen Exhaust Duct								

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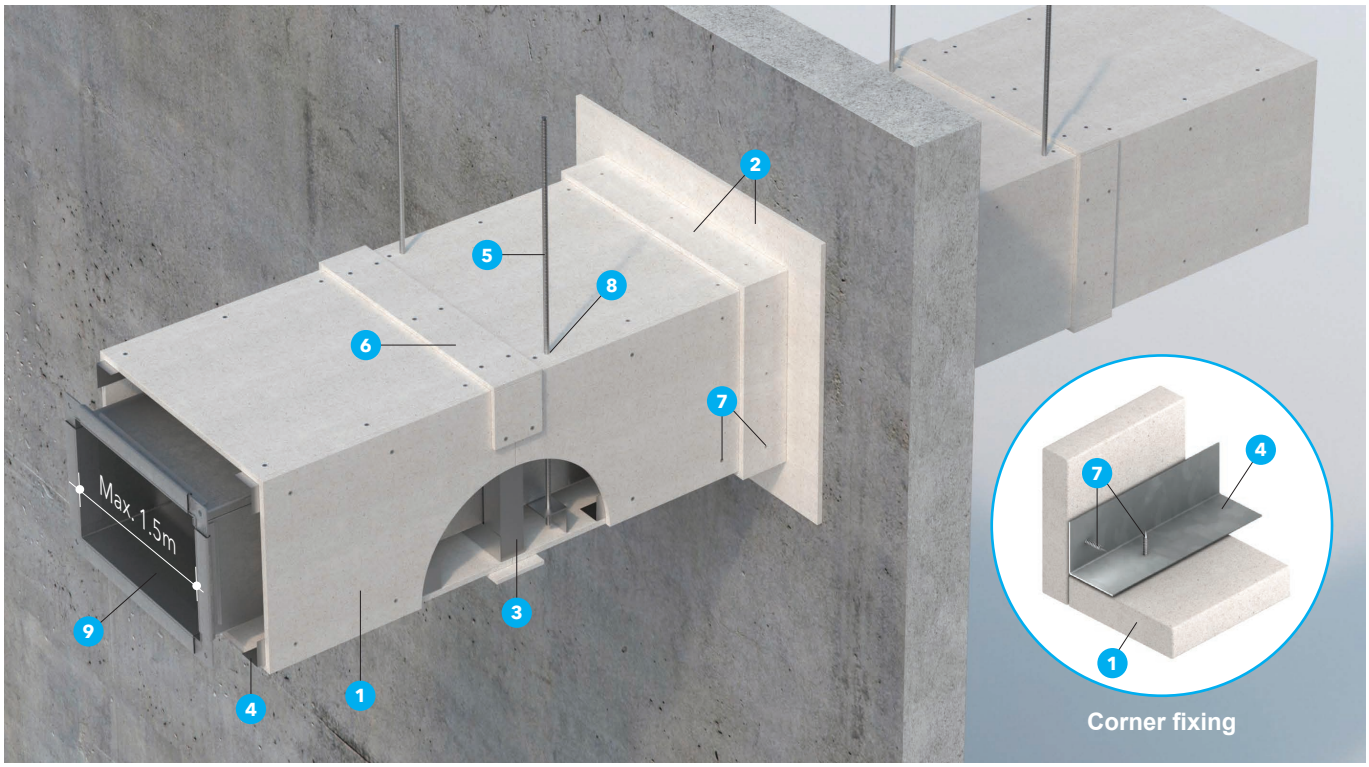
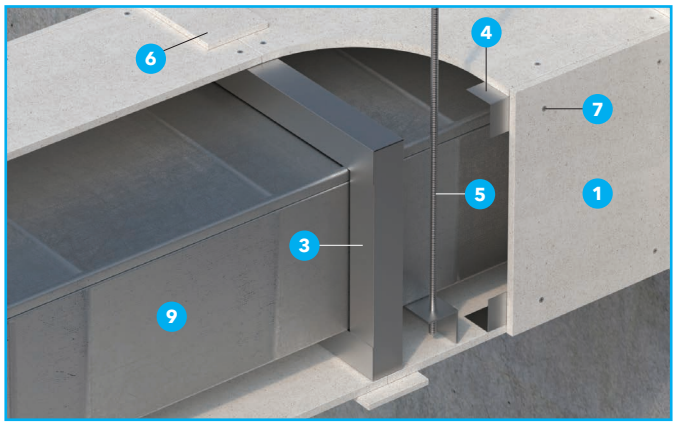
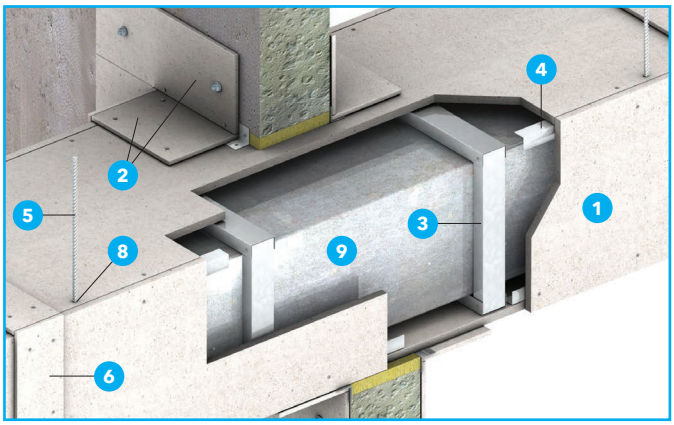
PROMATECT®H Fire Resistant Cladding to Steel Ducts Fulfils Stability and Integrity only

based on BS 476: Part 24





Hanger and stud fixing



Wall penetration

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

1. One layer of PROMATECT®-H board. 2-hour: 9mm; 4-hour: 12mm
2. PROMATECT®-H L-shaped collar 150mm wide, thickness in accordance with table below.

Fire resistance	Board/cover strip/collar thickness	Maximum stress allowance of hangers
120/120/-	9mm	10N/mm²
240/240/-	12mm	6N/mm²

3. Galvanised steel channel collar U-50 x 25 x 0.6mm thick coinciding with butt-joints at 1.2m centres.
4. Galvanised steel corner angle L-30 x 30 x 0.6mm thick.
5. Steel rod hangers, maximum stress allowance in accordance with table at right.
6. PROMATECT®-H cover strip 100 x 9mm thick or PROMASEAL®-A Acrylic Sealant coincide with butt-joint.
7. No. 8 self-tapping screws at nominal 200mm centres
8. Penetration gap sealed with PROMASEAL®-A Acrylic Sealant.
9. Steel duct supported by appropriate steel angle/channel bracket.

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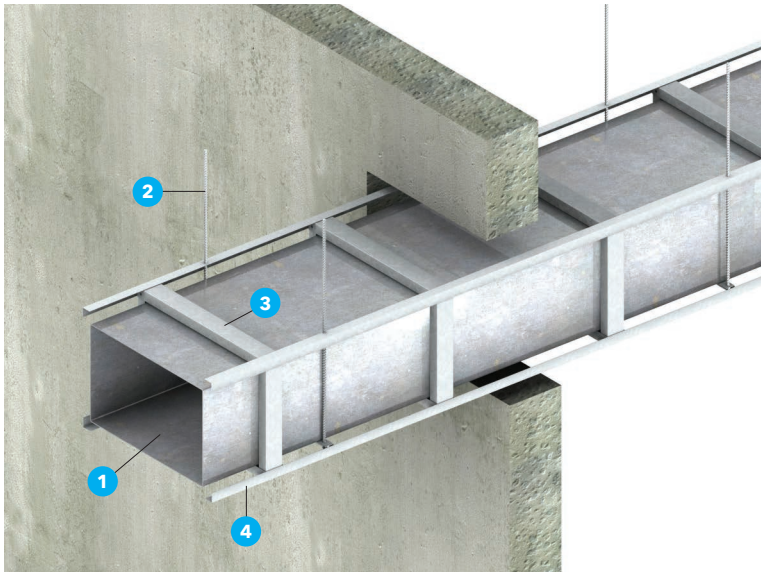
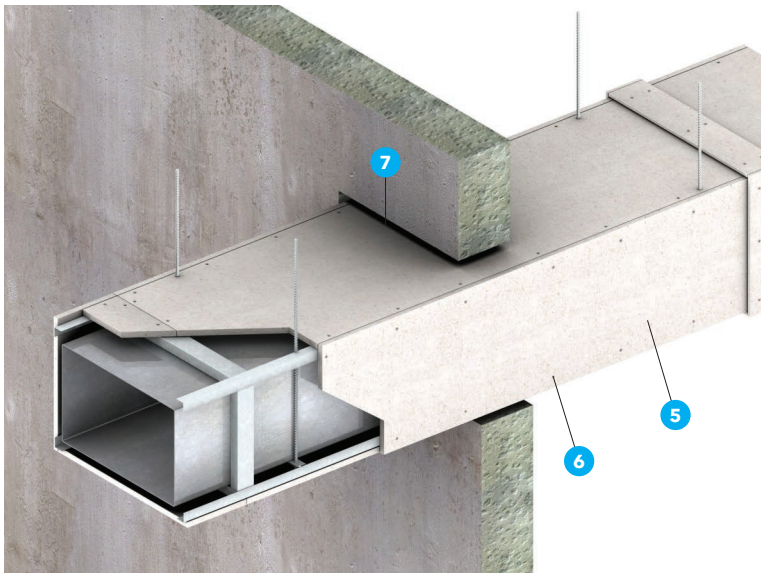
Sequence of Installation



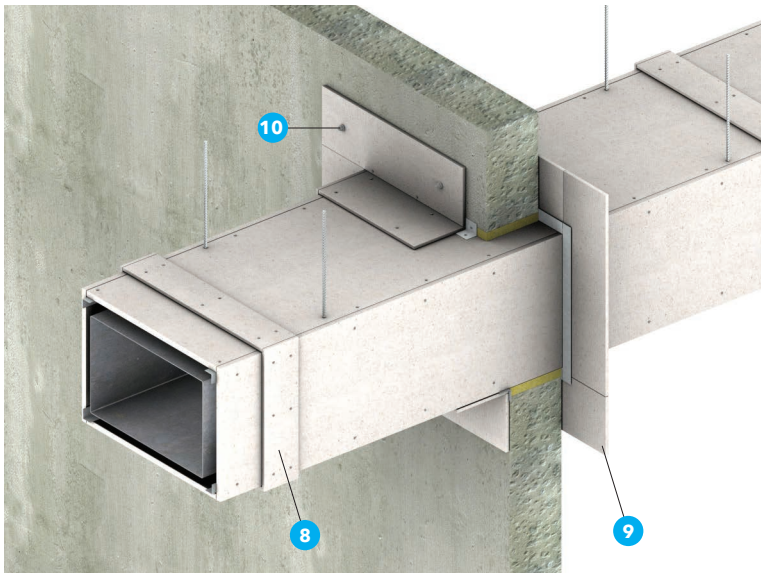
Construct steel channel collars framing around duct body follow by connecting corner angles to the framing

1. Ensure steel duct thickness, constructions, joints & etc to the requirements eg DW144.
2. Use suitable steel hanger rods commensurate to the unprotected tensile stress requirements. Hangers interval not exceeding 1.2m.
3. Construct steel channel collars and coincide with the boards' butt-joints.
4. Construct steel corner angle and connect it to the steel channel collar.



Fix PROMATECT®H boards to the preconstructed steel framing to clad around the steel duct

5. Measure the steel duct width and height. Cut the PROMATECT®H boards accordingly.
6. Place the boards against the preconstructed steel framing and fix it in place with suitable M4 self-tapping screw at nominally 200mm centres.
7. Stuck insulation infill rock wool into the penetration gap.



Use PROMATECT®H strip to cover all butt-joints and L-shaped collar at wall/floor penetration

8. Place the PROMATECT®H cover strips 100mm x 9mm over the butt-joints and fix in place with suitable M4 self-tapping screw at nominally 300mm intervals. Repeat these steps all-round the duct.
9. Similarly, construct a PROMATECT®H 9mm thick L-shaped collar at the wall penetration.
10. Fix the L-shaped collar in place with suitable anchor bolts.

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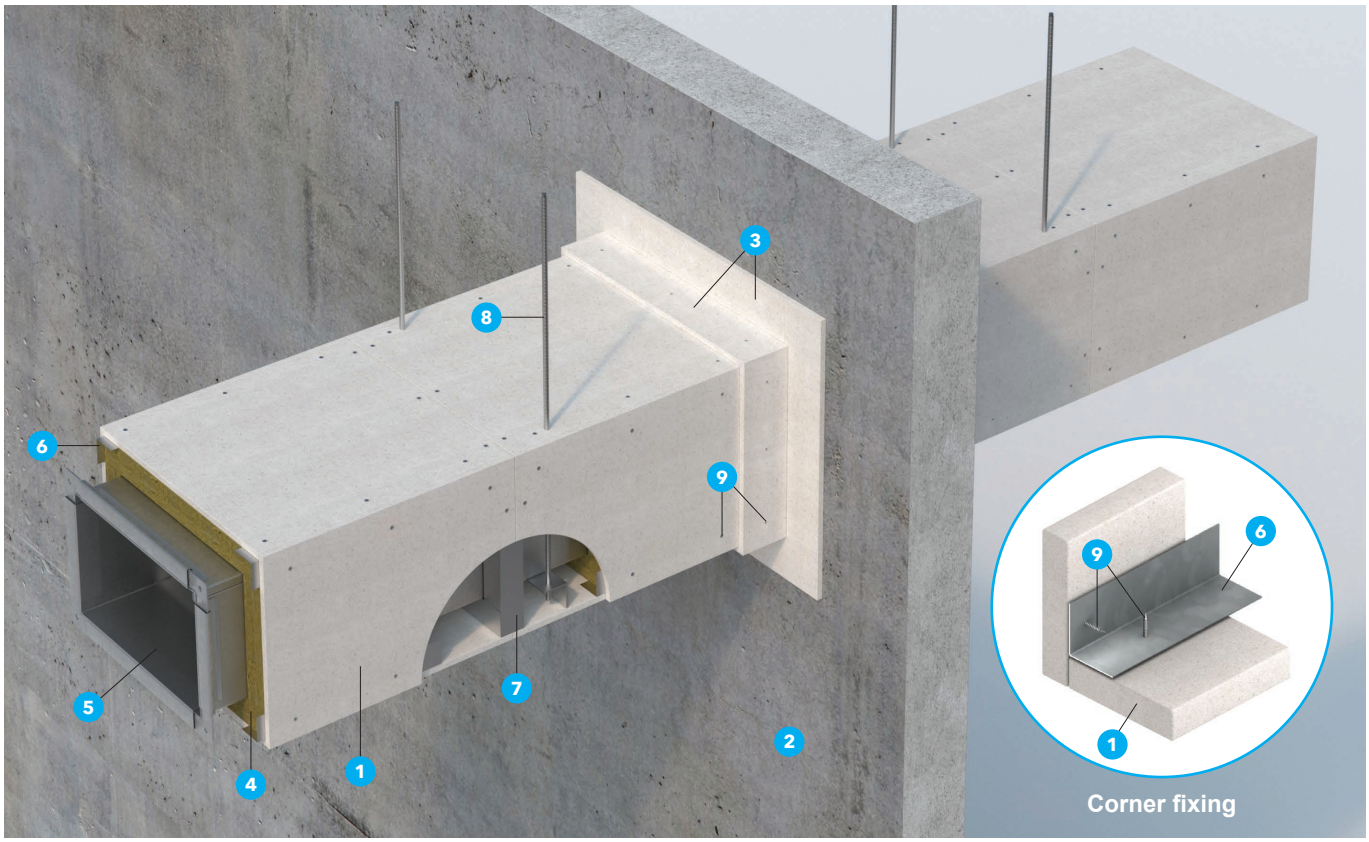
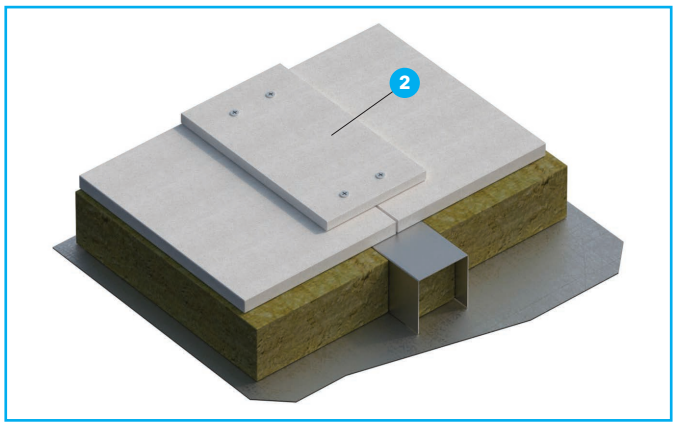
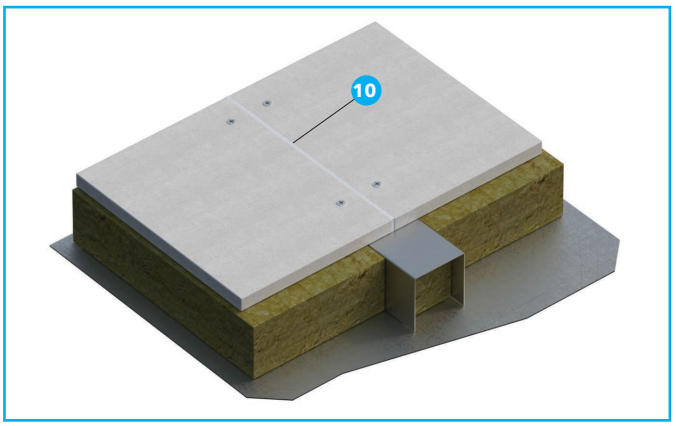
PROMATECT®H Fire Resistant Cladding to Steel Ducts
Fulfils Stability, Integrity and Insulation

based on BS 476: Part 24





Board joints option 1



Board joints option 2

1. One layer of PROMATECT®-H board.
2. PROMATECT®-H cover strip 100 x 9mm thick or PROMASEAL®-A Acrylic Sealant coincide with butt-joint.
3. PROMATECT®-H collar 12mm to form L-collar at penetration through compartments wall of floor.
4. Mineral wool.
5. Steel duct with suitable support brackets and hanger rods.
6. Galvanised steel L-angles 50mm x 50mm x 0.6mm thick.
7. Galvanised steel U-channel framework 50mm x 50mm x 0.6mm at maximum 1200mm centres, infill with mineral wool of appropriate density.
8. Threaded steel hanger rods at maximum 1200mm centres or centres that limit stress to Max. 10N/mm² (120mins) 6N/mm² (240mins).
9. M4 self-tapping screws at maximum 200mm intervals.
10. PROMASEAL®-A Acrylic Sealant.

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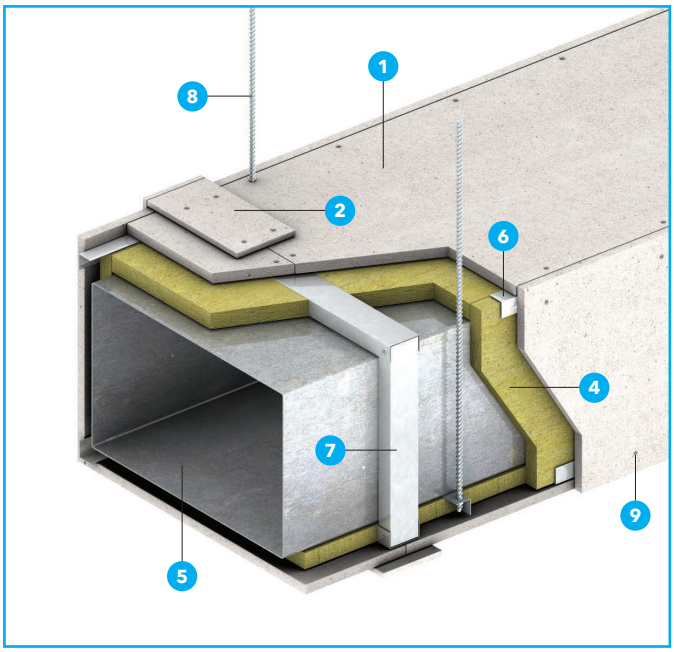
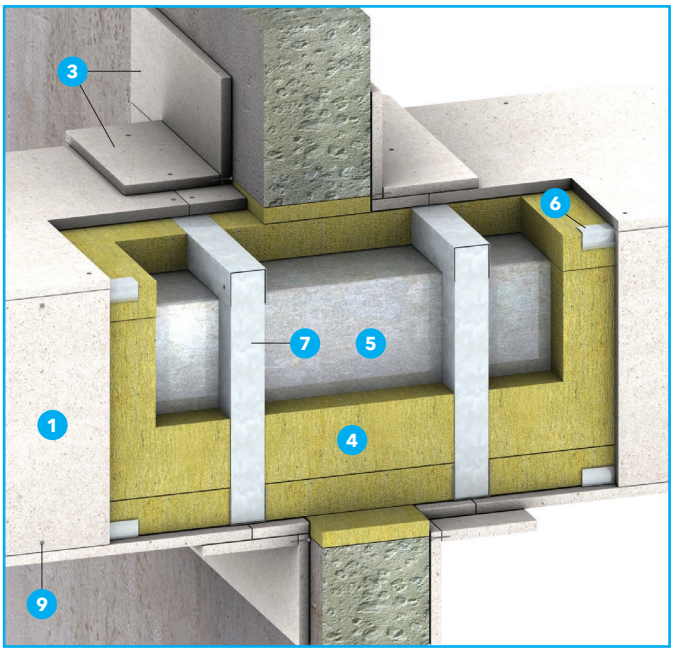
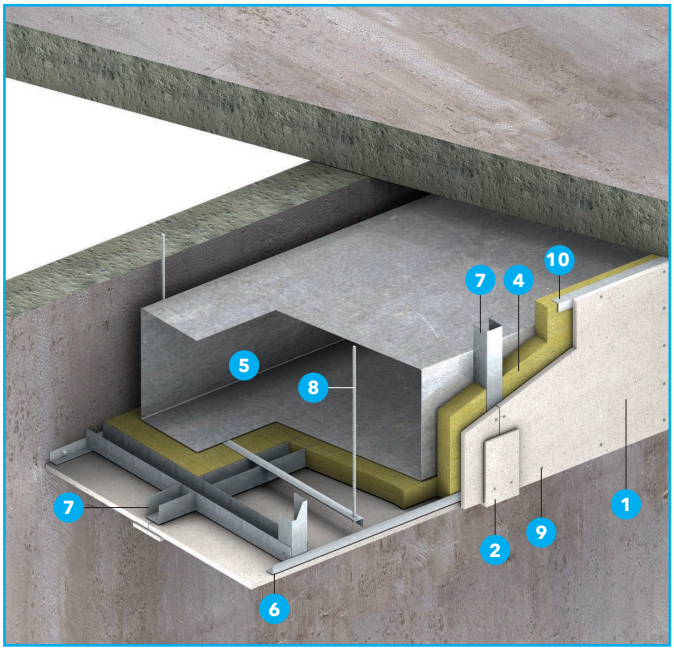
Additional fixing details



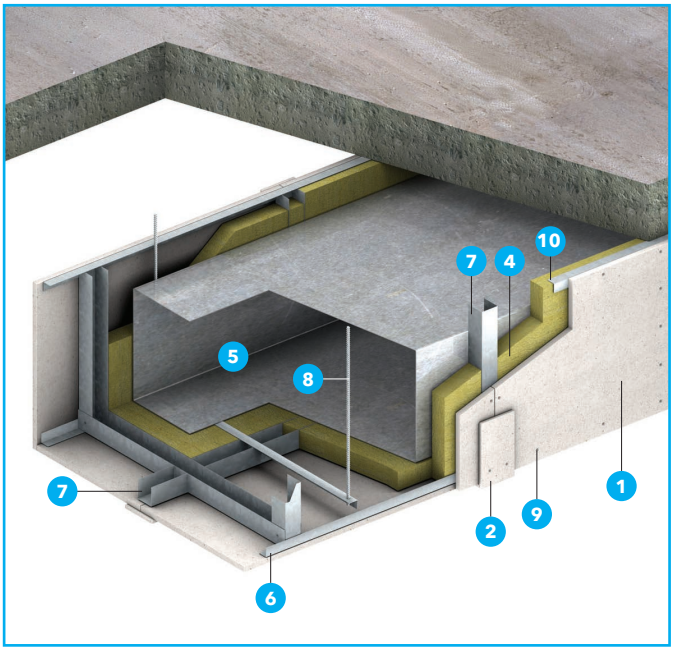
Internal framing detail



Wall penetration detail



Two sided cladding to steel ducts



Three sided cladding to steel ducts

1. One layer of PROMATECT®-H board. 2-hour: 9mm; 4-hour: 12mm
2. PROMATECT®-H cover strip 100 x 9mm thick or PROMASEAL®-A Acrylic Sealant coincide with butt-joint.
3. PROMATECT®-H collar 12mm to form L-collar at penetration through compartments wall of floor.
4. Mineral wool.
5. Steel duct with suitable support brackets and hanger rods.
6. Galvanised steel L-angles 50mm x 50mm x 0.6mm thick.
7. Galvanised steel U-channel framework 50mm x 50mm x 0.6mm at maximum 1200mm centres, infill with mineral wool of appropriate density.
8. Threaded steel hanger rods at maximum 1200mm centres or centres that limit stress to Max. 10N/mm² (120mins) 6N/mm² (240mins).
9. M4 self-tapping screws at maximum 200mm intervals.
10. Continuous wall/floor steel angles 40mm x 40mm x 1.5mm thick.

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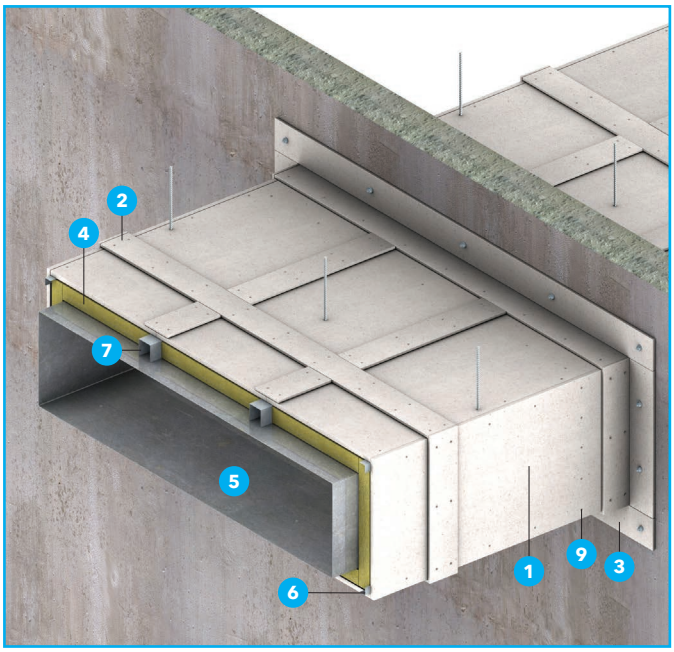
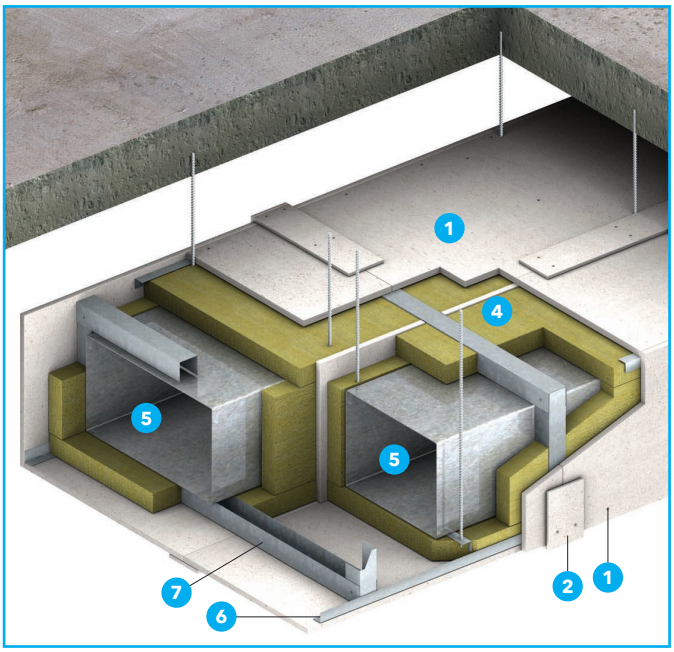
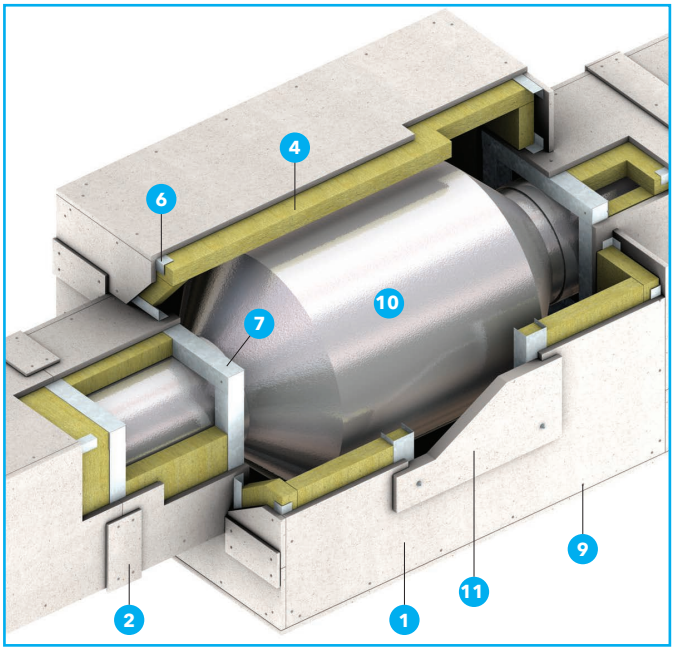
Additional fixing details



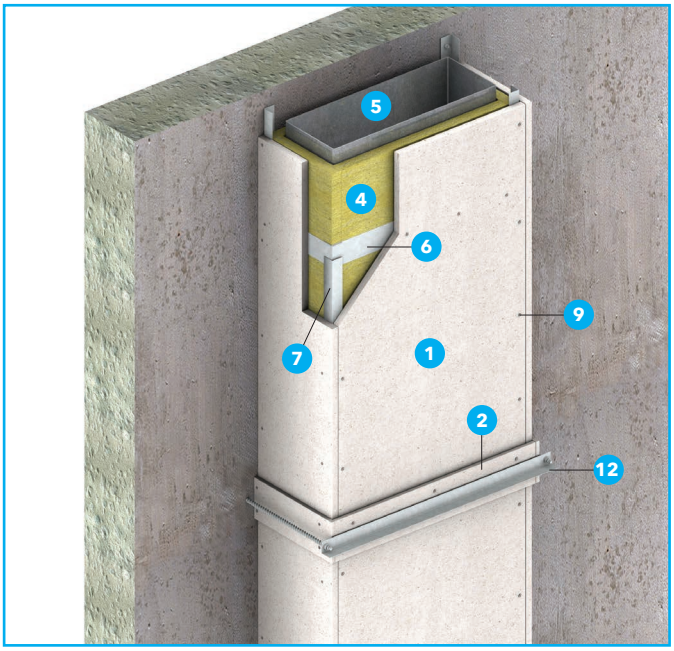
Internal duct size up to 10m



Multiple duct cladding



Two sided cladding to steel ducts



Three sided cladding to steel ducts

1. One layer of PROMATECT®-H board.
   2-hour: 9mm; 4-hour: 12mm
2. PROMATECT®-H cover strip 100 x 9mm thick or PROMASEAL®-A Acrylic Sealant coincide with butt-joint.
3. PROMATECT®-H collar 12mm to form L-collar at penetration through compartments wall of floor.
4. Mineral wool.
5. Steel duct with suitable support brackets and hanger rods.
6. Galvanised steel L-angles 50mm x 50mm x 0.6mm thick.
7. Galvanised steel U-channel framework 50mm x 50mm x 0.6mm at maximum 1200mm centres, infill with mineral wool of appropriate density.
8. Threaded steel hanger rods at maximum 1200mm centres or centres that limit stress to Max. 10N/mm² (120mins) 6N/mm² (240mins).
9. M4 self-tapping screws at maximum 200mm intervals.
10. Bifurcation fan.
11. Maintenance access panel constructed from PROMATECT®-H board.
12. Duct support steel bracket.

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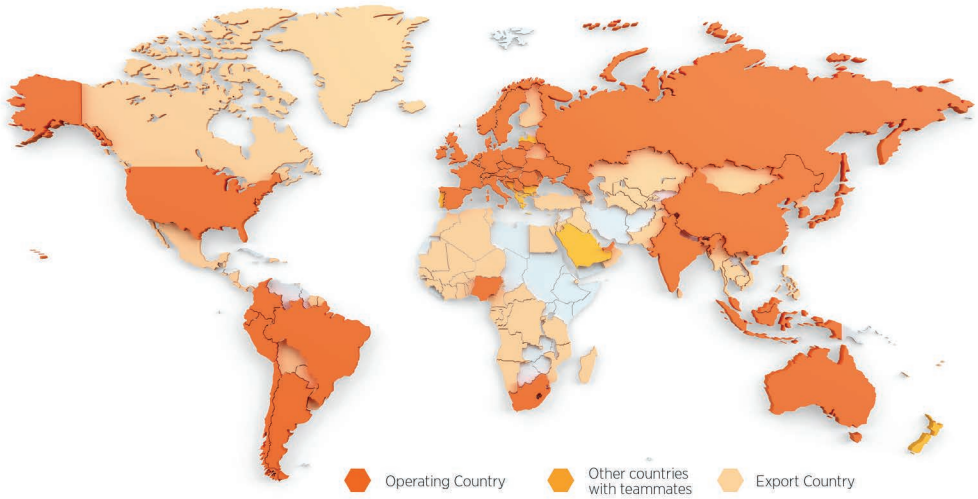

About Etex

Etex is a global building material manufacturer and pioneer in lightweight construction. Etex wants to inspire people around the world to build living spaces that are ever more safe, sustainable, smart and beautiful.

Founded in 1905, headquartered in Zaventem, Belgium, Etex is a family-owned company with more than 13,500 employees globally. It operates more than 140 sites in 45 countries and recorded a revenue of EUR 3.0 billion and a REBITDA of EUR 570 million in 2021. Etex fosters a collaborative and caring culture, a pioneering spirit and a passion to always do better for its customers.

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

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

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

Etex is Inspiring Ways of Living, for more information, please visit our website: www.etexgroup.com