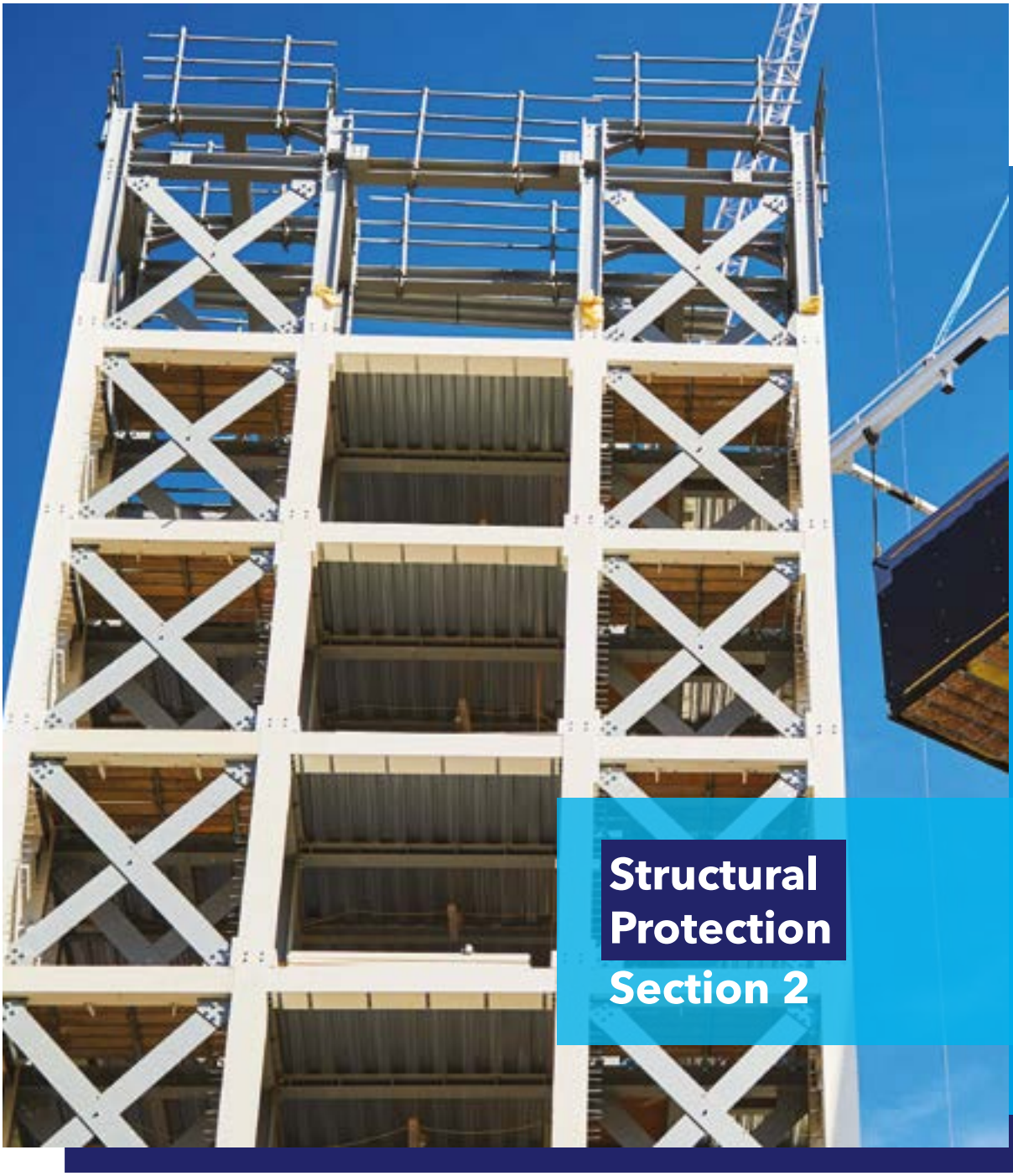
Promat®

VERSION 1	MARCH 2025

Please check that this is the current version by visiting the Promat website. For archived versions please contact technical services.

The Passive Fire Protection Handbook



Structural Protection Section 2

etex inspiring ways of living

Contents

COMPARTMENTATION

SUPALUX®
Up to 240 minutes fire resistance
1 Compartment walls
2 Timber floors
3 Protected zones

MASTERBOARD®
Up to 30 minutes fire resistance
4 Timber floors
5 Timber stud partitions

PROMATECT®-250
Up to 120 minutes fire resistance
6 Mezzanine floors

THERMAL UPGRADE

PROMAT TLFR®
7 Concrete slab

STRUCTURAL PROTECTION

VERMICULUX®-S
Up to 240 minutes fire protection
8 Structural steel

PROMATECT®-XW
Up to 60 minutes fire protection
9 Structural steel

PROMATECT®-H
Up to 240 minutes fire protection
10 Concrete slab and beams
11 Concrete columns and walls

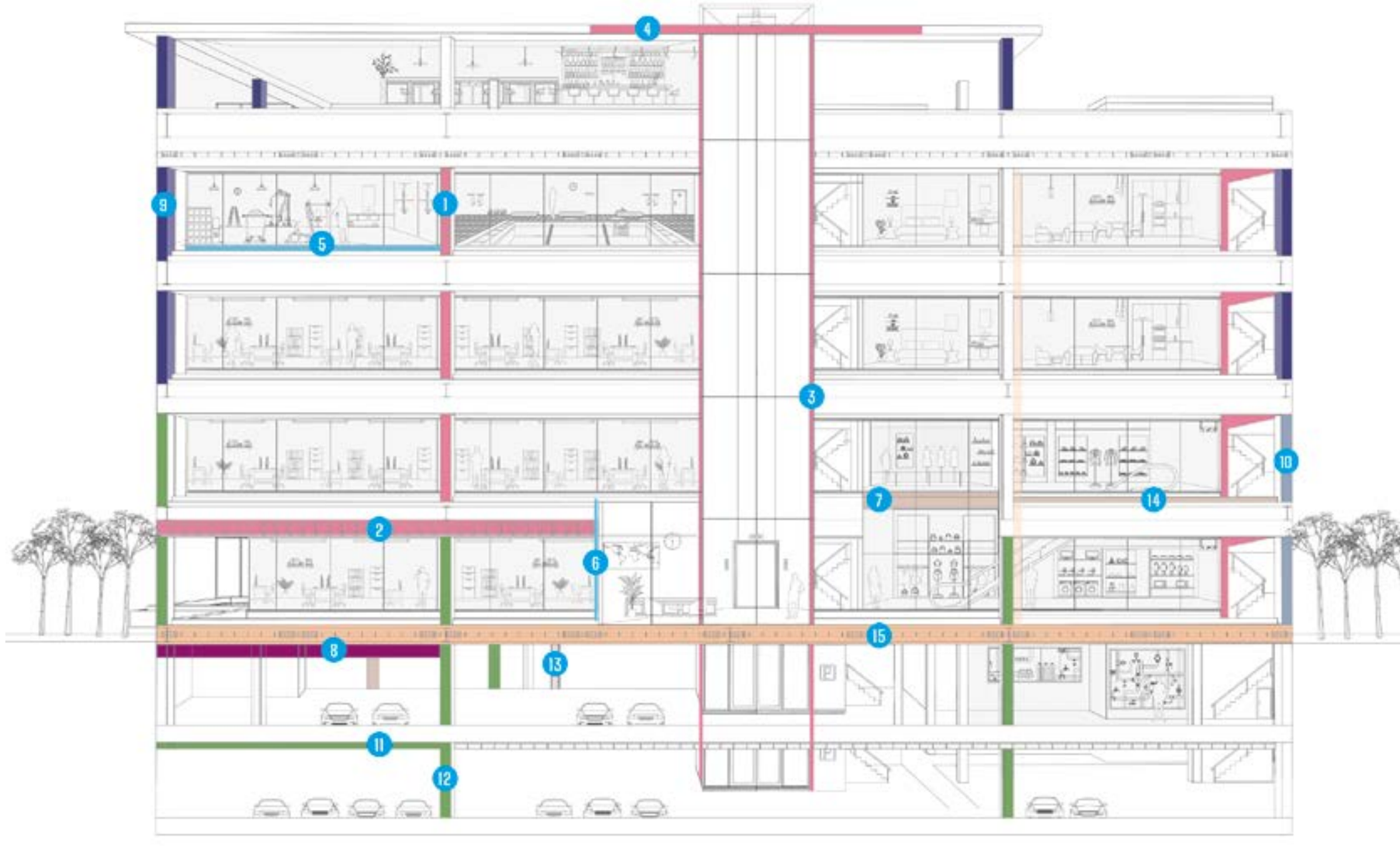
PROMATECT®-250
Up to 120 minutes fire protection
12 Wind posts
13 Structural steel

DUCT PROTECTION

PROMATECT®-L500
Up to 120 minutes fire protection
14 Duct protection

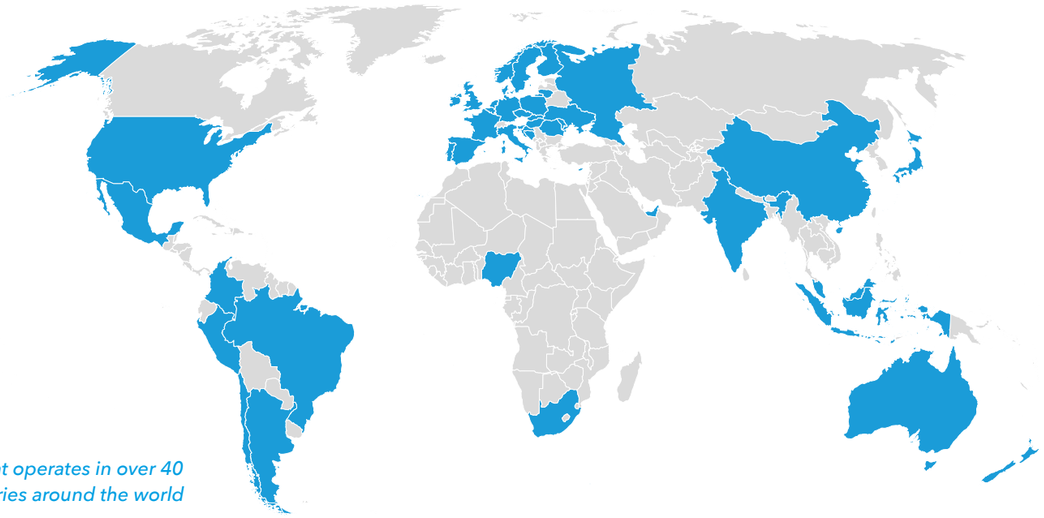
Promat from top to bottom

An overview of Promat applications



Who are **Promat?**

For more than 60 years, Promat has been designing, testing and manufacturing specialist fire protection systems. This means that our customers benefit from a complete portfolio from which to build a certified fire safety solution that is right for their project.



Promat operates in over 40 countries around the world

Why choose Promat?

Our fire testing culture

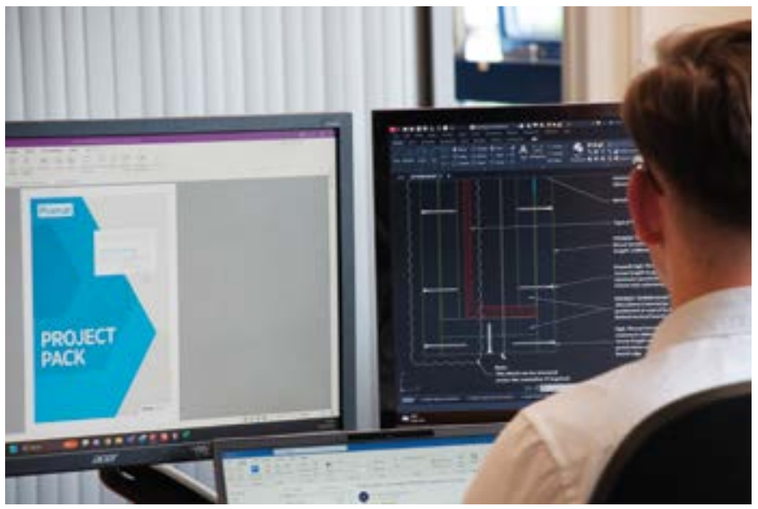
Our team of fire test engineers work with certified laboratories to undertake an impressive program of global and local fire tests to ensure our systems perform at their best.

Our research and development

Our researchers constantly look for solutions to develop new, lightweight fire protection solutions that will help reduce our impact on the planet and contribute to the circular economy.

Our expertise

Our dedicated Technical Support team along with our extensive testing, certification and design support tools enable us to provide a superior level of support at every stage of your project.



Who are **Etex?**

Etex is the UK's leading provider of lightweight construction solutions. Our combined expertise in drywall, passive fire protection and firestopping has created a range of unique solutions from the building envelope to internal linings, partitions and penetrations.

Part of the Etex group

We are proud to be part of Etex, playing a key role in its mission to build living spaces that are ever safer, smarter, and more sustainable. This means that our customers benefit from the certainty and choice from working with a key global manufacturer of interior and exterior building solutions.

FSi Promat®

Our fire stopping range is now available via our sister company FSi under the joint branding of FSi Promat. FSi have over 23 years of specialist knowledge in fire stopping and offer a large range of both fire stopping and cavity barrier products and systems. **Visit FSiltd.com to find out more.**

"WE'RE COMMITTED TO MAKING SURE OUR CUSTOMER'S PROJECTS BENEFIT FROM HIGH QUALITY FIRE PROTECTION PRODUCTS AND SYSTEMS THAT ARE TESTED, CERTIFIED AND TRUSTED. COMBINED WITH OUR COMMITTED TECHNICAL SUPPORT, WE ENABLE THE BUILDING OF EVER SAFER LIVING AND WORKING SPACES, AS WELL AS MORE SUSTAINABLE INDUSTRIES AND ENERGY SOURCES.

WE'RE EXTREMELY PROUD OF THE HARD-EARNED TRUST OUR CUSTOMERS HAVE IN US AND OUR SOLUTIONS."

JOSH SLACK, – PROMAT COMMERCIAL DIRECTOR.

Services Offered

Whilst our literature has details of most typical systems and installations, we understand that every project is different and there are bound to be situations when you or your customer need access to expert advice. For this reason, our Promat Technical Services team is on hand to help.

Our highly experienced team can provide advice on any query you may have related to the specification or installation of Promat products and systems.

We also operate a training centre based at our UK headquarters in Bristol. We are able to offer practical training to demonstrate the speed and simplicity of installation. It allows you to get advanced knowledge of our product capabilities, meaning it is ideal for specifiers, main contractors, distributors and sub-contractors. For more information please contact **technical@promat.co.uk**

Online resources

The Promat website contains a wealth of information that help you to:

- Choose which fire protection system would best suit your fire protection requirements, with online access to The Passive Fire Protection Handbook.
- Obtain technical documentation and Declarations of Performance.
- Find information about the sustainability of our products and EPDs.
- Gain inspiration from our library of case studies, visit: **promat.com/case-studies**

We also have a comprehensive set of FAQs which answers the most common questions and can be filtered by Product, Performance, Application and Installation: **promat.com/knowledge-base**

Fire Testing and Golden Thread

The highest testing standards

Our materials, products and systems are the result of a rigorous research and testing process, validated by independent certification authorities. This testing regime goes beyond basic regulatory requirements and our systems are tested in real-world conditions to ensure that they live up to their promise.

At the Promat Research and Technology Centre, we perform more than 200 fire tests a year to ensure our products and systems will comply with the most stringent international standards and regulations. This is supplemented by local testing at our UKAS accredited fire test facility in Heywood, Manchester. Where possible, our fire tests go beyond what is demanded by regulations and replicate the real-life context where our products can be installed. When a Promat system passes the required series of testing, we have 3rd party certification or classification reports to provide evidence that our systems perform as stated and meet the appropriate standards.

Supporting the Golden Thread

The Building Safety Act 2022 sets out requirements for the collection and maintenance of building information across its lifecyle. This is known as the Golden Thread.

Product information is a key element of the Golden Thread and as a manufacturer this is a responsibility we take very seriously. Our strong testing culture means we are well positioned to help ensure the right performance information is available in a digital format when needed – whether that is needed during the design, construction or operation of a building.

This information is provided across multiple documents such as 3rd party certification, classification reports, ETAs, DoP's, Safety Data Sheets, Product Data sheets, drawings and ISO Certificates. The required information for specification is captured in Promat Project Packs which contains installation guidance, specification clauses, standard detail drawings and supporting evidence, assisting the project team in demonstrating full traceability of what has been installed. This pack can then also be used by the Accountable Person(s) during the use of the building.

Introduction to Fire Protection of Structural Steel and Concrete

Introduction to Fire Protection of Structural Steel and Concrete

Building Regulations require that buildings shall be designed and constructed so that their 'stability will be maintained for a reasonable period'

In other words, they should not collapse prematurely, in order to allow time for the occupants to escape and for the fire service to obtain access. In most modern buildings the load-bearing function is provided by steel or concrete framework and structural concrete decks to which the rest of the building is attached.

The extent to which a structural element requires fire protection depends upon such factors as size, height, use and occupancy of the building and the function of the element.

Promat have solutions for steel and concrete protection using boards which can provide up to 4 hours protection depending on the application.

An advantage of a Promat board system is that we also have certification for fire insulation and fire integrity and therefore fire compartmentation can be maintained where a structural element falls in-line with the building's fire compartment walls and floors.

The structural protection of steel and concrete can also be maintained by using a Promat SUAPLUX® suspended membrane ceiling.

Fire Prote Structural Steel

Steel framed structures now account for some 45%* of the multi-storey framed market, with stringent criteria for fire protection requirements.

When calculating the level of fire protection to steel, the following factors need to be taken into consideration:

- Duration of fire resistance specified.
- Type of protection used.
- Perimeter of the steel section exposed to fire.
- Shape and size of the steel section.
- The limiting steel temperature for the structural design.

To determine how these factors affect fire resistance, all Promat products and systems have been tested at accredited laboratories to a variety of standards, e.g. EN 13381-4 and BS 476: Part 21.

Tests in accordance with EN 13381-4: 2013 and BS 476: Part 21: 1987 have been performed on loaded beams and columns clad with Promat fire protection materials. Steel temperatures are monitored with thermocouples to assess the performance of the fire protection.

Tabulated data is then published for each board for a range of different limiting steel temperatures, fire periods and steelwork section factors.

*CCPI Compliance check, source BCSA.

Section Factor

The section factor of a hot rolled/formed or fabricated steel profile is defined as the ratio of surface area of the member per unit length (A_m) divided by the volume per unit length (V). It is measured in units of m^{-1}.

This ratio is a measure of the rate of increase in temperature of a steel member. Members with low section factor will heat up more slowly than a member with a high section factor. By convention, section factor is usually written A/V.

Please see following pages in this section for tables for each product and tables for standard steel profiles and calculation methods.

Cellular and Castellated Beams

Long span beams with web openings are commonly known as 'cellular beams' or 'castellated beams' and have numerous openings in the web to accommodate service items such as pipes and ducts. The provision of the openings for the service items allows longer spans and a reduced storey height for more economic building construction. The openings can be circular, square, or rectangular, although circular openings are most commonly used.

Cellular beams can be manufactured by cutting shaped apertures of an appropriate pattern in the web of the parent sections and re-welding the parts together to form a deeper web beam with openings in the web. They can also be manufactured by welding three plates together, with holes pre-cut in the plate forming the web. The beams may be asymmetrical i.e. have different sized upper and lower portions or flanges.

The introduction of openings in the web of the steel beam means the structural capability of the beam differs from that of a solid beam in that the failure mode in fire is related to the closeness of holes and the web slenderness in addition to section factor. Structural failure can be through Vierendeel bending or buckling of the web post. These failure modes generally occur at lower temperatures than a plain beam of the same size.

Therefore, it is necessary that such beams are structurally evaluated taking into account all possible modes of structural failure under both ambient and fire conditions.

Due to the different behaviour of cellular beams, it is necessary for additional thermal data to be measured around the web openings and on the web posts. The additional thermal data to be used in conjunction with a structural model to determine limiting temperatures of beams with web openings.

There are currently a number of structural models that can be used to determine the structural capability of beams with openings in the web. The Steel Construction Institute (SCI) published a number of structural models over a period of time based on progressive improvements which uses data derived from tests on products supplied by ASFP members to an agreed test programme.

The current SCI guidance is RT1356, and only RT1356 or an equivalent structural model shall now be used. Historical SCI RT documents have been withdrawn and should not be used. A new European standard, EN 1993-1-13, is being drafted which will exist alongside RT1356.

Cellular beams are usually designed for specific applications and as such will have a limiting temperature calculated from a structural model by a specialist manufacturer or a structural engineer recognised by the Engineering Council or other competent person.

The method of calculating section factor and fire protection thickness for cellular beams is different than for other solid steel sections. Further guidance on these systems can be found in the ASFP Yellow Book - Fire Protection for Structural Steel in Buildings - Volume 1.

Bracing

Bracing is included in a structure to give resistance to wind forces and provide overall stiffness to the steel frame. The probability of a major fire occurrence being concurrent with a maximum wind load is considered remote and this factor is taken into account when calculating the section factor for the bracing.

The steel size for the bracing tends to be lighter in comparison with the main frame and therefore has high Section Factors and correspondingly requires high thicknesses of fire protection. The fire Eurocodes give no guidance on this, however, BS 5950 Structural use of steelwork in building, Part 8: Code of practice for fire resistant design recommends that the fire protection thickness should be based on the section factor of the steel member, or a value of $200m^{-1}$, whichever is the smaller value, linked to a critical temperature of 500°C.

Lattice Members

As the determination of the protection necessary for lattice members requires broad consideration of the lattice design, please contact the Technical Services Department for advice concerning such steel sections.

Partially Exposed Members

Where columns or beams are partly built into or are in close contact with walls or floors, then account can be taken of the protection afforded to the steelwork by the wall or floor.

In the case of concrete or masonry, this will give protection to the adjacent surface of the steelwork for the purpose of determining the heated perimeter.

Wind Posts

Wind posts are a common way of providing lateral support to tall masonry walls in modern steel-framed buildings.

In situations where the walls are also required to provide fire resistance between two compartments (or at a boundary position), the fire protection applied to the wind posts must also maintain the fire compartmentation across the wall construction at that point.

Cold Formed Sections

This type of section would normally necessitate separate appraisal because of the high A/V values and the way the sections are formed which can influence their failure criteria.

Research is continuing to formulate recommendations for the application of data given in the ASFP Yellow Book. Some information on the protection of cold formed members is given in the SCI publication 129 – 'Building design using cold formed members'.

Cold formed sections are generally formed from thin gauge steel. This loses strength in fire more quickly than hot rolled steel. In general, limiting temperatures for cold formed sections are 50°C to 100°C lower than for hot rolled sections. This, combined with the relatively high section factors for cold formed sections, means that fire protection thicknesses are relatively high.

There are a variety of sections formed from cold rolled sections and normally each would require separate appraisal. **Promat do not have any standard solutions suitable for use on cold formed steelwork sections.**

Deck voids above composite and non-composite beams

Composite steel deck floors comprise reinforced concrete cast on top of profiled steel decking, which acts as formwork during construction and external reinforcement at the final stage. The decking may be either re-entrant or trapezoidal.

DETAIL 2.1

RE-ENTRANT DECKING

TRAPEZOIDAL DECKING

The deck is usually through deck welded to the top flange of the beam by shot fired shear studs before an anti-crack mesh is installed and the concrete is poured. When the concrete is dry the steel and concrete work together to resist the loading. In certain rare instances, shear studs are not used and the construction is non-composite.

The use of beams oriented perpendicularly to profiled steel decks creates voids between the top flange of the beam and the metal deck. The consequence of this is that the top flange gets hotter than would happen if the floor slab was a plain precast slab.

With a dovetail profile, these voids are small and no action is generally necessary.

With trapezoidal profiles, the voids are comparatively large. This creates a situation where some actions are required to balance the impact of the added heating of the top flange.

This can be either:

- Fill the void between the top flange of the beam and the deck with a suitable material.
- Leave the void unfilled but increase the thickness of the fire protection on the rest of the beam.

See Table 2.1 (Below) for further details.

Voids at Compartment Walls

Voids must be filled on beams that are part of a compartment wall, otherwise the integrity and insulation criteria of the wall will be breached. Voids may only be left unfilled on beams that do not form part of a compartment wall.

Where non-composite beams support trapezoidal steel deck floors, all voids must be filled. Although it is rare for a steel beam supporting a composite steel deck floor slab not to be designed to act compositely, a fire protection contractor will normally not be able to tell whether a beam is composite simply by visual inspection. In a finished building, the shear connectors will be covered by the floor slab and so the contractor will have to obtain confirmation from an appropriate engineer. Consequently, if the contractor is unable to determine if the beam is composite or not, and the deck is trapezoidal, all voids above the flange must be filled.

For decks with the profile running parallel to beams, for board protection, the boards should be taken past the edge of the flange to abut the underside of the deck.

TABLE 2.1. RECOMMENDATIONS FOR BEAMS WITH VOIDS ABOVE TOP FLANGES - TRAPEZOIDAL DECKS

Beam Type	Fire protection on beam	Fire resistance (minutes)		
		Up to 60	90	Over 90
Composite	Passive (non-reactive) and reactive	Increase thickness by 20% or assess thickness using A/V increased by 30%*	Increase thickness by 30% or assess thickness using A/V increased by 50%*	Fill voids
Non-composite		Fill voids		

* The least onerous option may be used.

STEEL ENCASEMENTS - BOARDS OVERVIEW

	Reaction to Fire	Testing	Board Finish	Intended Use	Working Life
VERMICULUX®-S **UP TO 240MINS FIRE PROTECTION** 	Classification A1 Non-combustible.	Certificate No. CF 5757 VERMICULUX®-S is assessed in accordance with ASFP Yellow Book 5 based on test data from BS EN 13381-4 and BS EN 13381-9 for up to 240 minutes fire resistance including cellular beams and beams up to 2m deep. Tested at limiting temperatures from 350°C up to 750°C.	Off-white in colour. Encasements give a clean boxed appearance and can be applied over unpainted steelwork. It can also accept a decorative finish and therefore be used where aesthetics are important. **For finishes, including plastering, please refer to Section 7 of The Passive Fire Protection Handbook.**	VERMICULUX®-S is suitable for semi- exposed or internal areas. The product, in accordance with EAD 350142-00-1106, the board intended use is for a Z_1 and Z_2 environments. The board can be installed before the building is weather tight (Undercroft car parks, plant rooms and unheated areas) for **up to 6 months.** The board should not be subjected to running water or have water pooling on or around it.	VERMICULUX®-S has a working life of 25 years for the intended use Z_1 and Z_2 environments in accordance with ETA 19/0434 – 3/20.
PROMATECT®-250 **UP TO 120MINS FIRE PROTECTION** 	Classification A1 Non-combustible.	Certificate No. UL-EU-01220-CPRa PROMATECT®-250 is tested and assessed in accordance with BS EN 13381-4 for up to 120 minutes fire resistance. Tested at Limiting temperatures from 350°C up to 750°C.	Off-white in colour. One face is smooth and ready to form a finished surface, able to receive almost any form of architectural/finish treatment. The reverse face is sanded. **For finishes, including plastering, please refer to Section 7 of The Passive Fire Protection Handbook.**	PROMATECT® 250 is not suitable for use in areas subject to continuous damp or higher humidity and is for internal applications only. The product, in accordance with EAD 350142-00-1106, the board intended use is a Z_2 environment. The board should not be installed before the building is watertight.	PROMATECT® 250 has a working life of 25 years for the intended use Z_2 environment in accordance with ETA 08/061 -3/12.
PROMATECT®-XW **UP TO 60MINS FIRE PROTECTION** 	Classification A1 Non-combustible.	Certificate No. CF 5942 PROMATECT®-XW is tested and assessed to provide fire resistance in accordance with BS476: Part 21: 1987 for up to 60 minutes. Tested at Limiting temperatures from 300°C up to 650°C.	Off-white in colour. Encasements give a clean boxed appearance and can be applied over unpainted steelwork. It can also accept a decorative finish and therefore be used where aesthetics are important. **For finishes, including plastering, please refer to Section 7 of The Passive Fire Protection Handbook.**	PROMATECT®-XW can be installed before the building is weather tight (Undercroft car parks, plant rooms and unheated areas) for **up to 6 months.** PROMATECT®-XW is not designed for use in areas subject to continuous damp or higher humidity, and is for internal applications only. The board should not be subjected to running water or have water pooling on or around it.	25 years

VERMICULUX®-S is an A1 non-combustible high performance calcium silicate board, for use in structural steelwork protection systems with fire protection of up to 240 minutes, and can be installed before the building is weathertight.

VERMICULUX®-S is often used in the early construction phase when the building is not weathertight. The boards are commonly used in buildings where insurance companies require an extended fire protection period of up to 240 minutes, e.g. buildings storing high value items or assets, and where additional fire safety measures are required for high risk areas, such as boiler or plant rooms, transport infrastructure and power stations.

VERMICULUX®-S is off white in colour and has a smooth sanded surface on one face with a lightly honeycombed texture on the reverse face. Encasements have a clean, boxed appearance and can be applied to unpainted steelwork. The board is available in a range of thicknesses and can be used in a single or double layer, according to requirements.

VERMICULUX®-S can also accept a decorative finish and therefore be used where aesthetics are important.

The board is classified A1 non-combustible according to BS EN 13501-1. VERMICULUX®-S encasement systems can be installed using framing components which are also sourced from Etex Building Performance Ltd, giving the advantage of a single source for all components required.

Advantages

- A fully fire tested solution which has been independently assessed by Warrington Fire Testing and Certification, Certifire Certificate of Approval No. CF5757 in accordance with ASFP Yellow Book 5 based on test data from BS EN 13381-4 for up to 240 minutes fire resistance.
- A calcium silicate board that can be installed in semi-exposed environments such as within external cavities, car parks or plant rooms.
- The boards can be installed before the building is weathertight.
- Galvanised steel partition sections can be installed directly up to the face of the board and through fixed to the steel substrate wherever these partition sections abut a solid face of the encased steel profile.
- Lightweight with a board density of 480kg/m³ Available from 20mm to 35mm thicknesses.
- Can be used in either a single or double layer depending on the section factor, limiting steel temperature and fire protection period required.
- Tested at limiting temperatures from 350°C up to 750°C.

*VERMICULUX®-S IS RESISTANT TO THE EFFECTS OF MOISTURE AND WILL NOT PHYSICALLY DETERIORATE WHEN USED IN DAMP AND HUMID CONDITIONS. IT CAN BE INSTALLED UP TO 6 MONTHS BEFORE THE BUILDING IS WEATHERTIGHT. THE BOARD SHOULD NOT BE SUBJECT TO WATER RUN-OFF FROM SLABS OR OTHER PARTS OF THE BUILDING. THE BOARD SHOULD NOT BE IN CONTACT WITH STANDING WATER. WHERE THE BOARD IS LOCATED ON THE PERIMETER OF THE BUILDING AND SITS PROUD OF THE BUILDING LINE, EXPOSED SURFACES SHOULD BE GIVEN ADDITIONAL WEATHER PROTECTION USING A BREATHER MEMBRANE.

Design considerations - Maintaining Compartmentation

Where fire compartmentation is required as well as fire protection to the steel, fire insulation must be provided across the beam or column to the criteria of EN 1363-1 (maintaining fire insulation to average temperature rise of 140°C, maximum temperature 180°C).

The minimum thickness of VERMICULUX®-S board on **each side of the beam or column** is determined as follows. The board thickness is first calculated based on the steelwork section factor, limiting steel temperature and fire protection period. The thickness to achieve fire insulation is then taken from the table below. The thicker of the two board options should always be used.

TABLE 2.2. VERMICULUX®-S COMPARTMENTATION THICKNESS

Fire resistance (minutes)	Board thickness (mm)
60	20
90	25
120	30
240	50 (2 x 25mm)

Insulation within encasements: Low density (10-30kg/m^3) glass mineral wool only, if required for acoustic or thermal performance.

Fire/smoke-tight seal: All boards abutting surrounding structure to be sealed using FSi PROMAT Pyrocoustic® Fire Resistant Sealant - Designed to seal any slight gaps at interfaces between the boards and the substrate, which have low movement requirements (±7.5%). Contains no solvents or halogen compounds.

Maximum board thickness: VERMICULUX®-S boards are supplied in 20mm, 25mm, 30mm & 35mm thick formats. All encasements requiring board thicknesses in excess of 35mm thick must be applied in two layers.

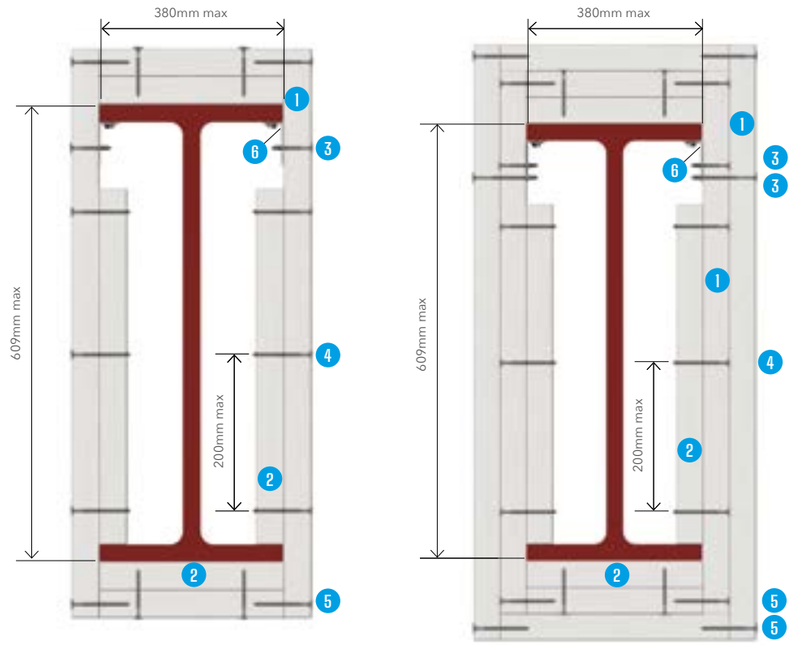
Different Profiles & Fixing Methods

The following pages show Promat's standard VERMICULUX®-S solutions for the protection of I-section beams and H-section columns, with maximum permissible dimensions for each arrangement noted. The results for I/H-sections can be applied to hot-formed angles, channels and T-sections with the same section factor, using the same fixing method. Alternative structural steel profiles, such as square, rectangular and circular hollow sections can also be catered for, but may require different framing and fixing methods. For further details of these alternative steel profiles and fixing methods, please contact Promat's Technical Services Department.

VERMICULUX®-S is used to provide one, two, three or four sided encasements to:

- Universal columns and beams (I or H-sections) and joists
- Beams supporting composite floors with profiled metal decking
- Structural hollow sections
- Partially exposed members
- Cellular beams
- Beams up to 2m deep
- Perimeter beams
- Lattice beams
- Windposts
- Bracing

VERMICULUX®-S BEAM ENCASEMENTS
4-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer

Double Layer

DETAIL 2.2

System Name
ST VLUX-019S: 4 Sided Beam Protection up to 609mm deep and 380mm wide. Angle fix. Single and Double Layer.

Fire Performance
Up to 240 minutes

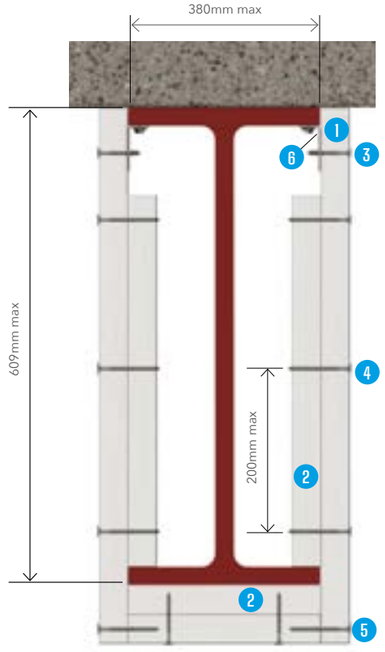
Certification Reference
CF 5757

Drawing Reference
ST VLUX-019 (Single Layer), ST VLUX-021 (Double Layer)

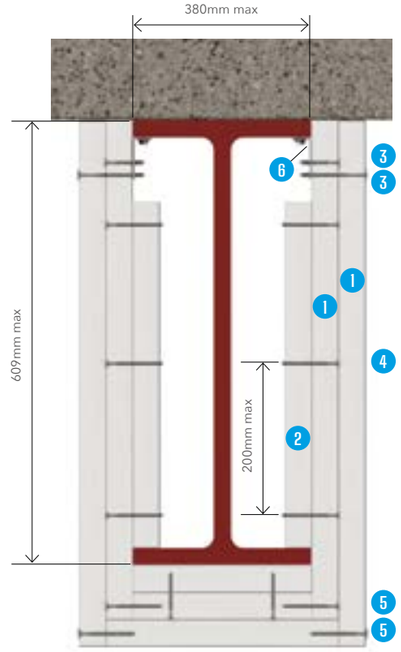
Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange, offset by a minimum of 3mm from the flange edge.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum 15mm into the coverstrip.
5. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
6. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

VERMICULUX®-S BEAM ENCASEMENTS
3-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer



Double Layer

DETAIL 2.3

System Name
ST VLUX-015S: 3 Sided Beam Protection up to 609mm deep and 380mm wide. Angle fix. Single and Double Layer.

Fire Performance
Up to 240 minutes

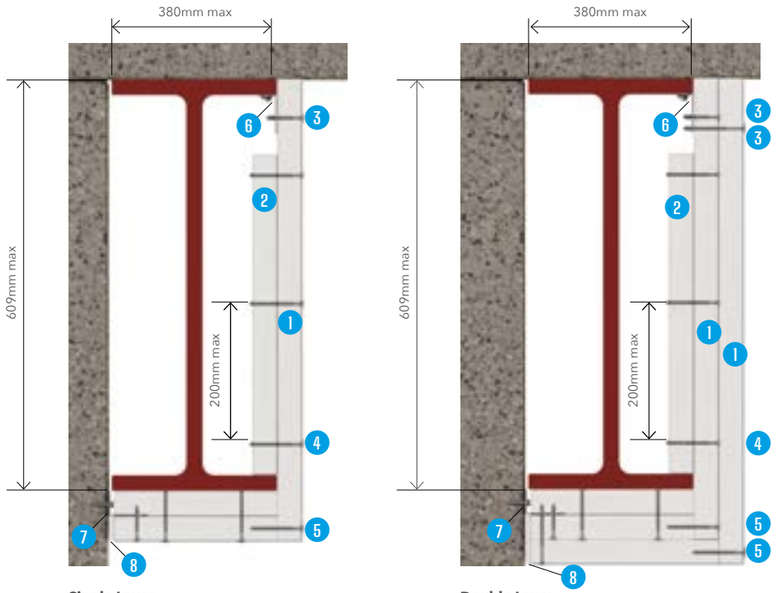
Certification Reference
CF 5757

Drawing Reference
ST VLUX-015 (Single Layer), ST VLUX-017 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange, offset by a minimum of 3mm from the flange edge.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.
5. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
6. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

VERMICULUX®-S BEAM ENCASEMENTS
2-SIDED BEAM ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE



Single Layer

Double Layer

DETAIL 2.4

System Name
ST VLUX-010S: 2 Sided Beam Protection up to 609mm deep and 380mm wide. Board fix to Angle, Angle fix to wall. Single and Double Layer.

Fire Performance
Up to 240 minutes

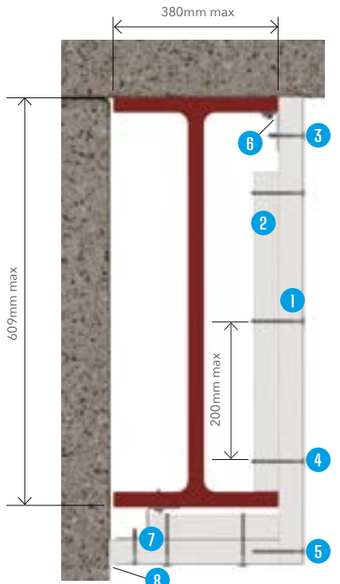
Certification Reference
CF 5757

Drawing Reference
ST VLUX-010 (Single Layer), ST VLUX-013 (Double Layer)

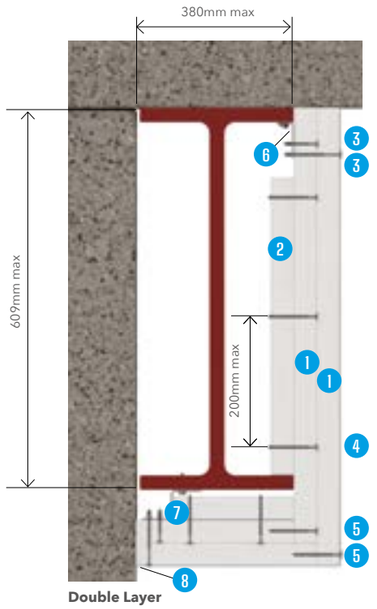
Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange, offset by a minimum of 3mm from the flange edge. Additional metal angle framing is fixed to the substrate to support soffit boards.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Board joints are coincident around the encasement.
   Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.
5. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
6. Metal Angle minimum 50 x 25 x 0.7mm: Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.
7. Where the beam abuts a concrete or blockwork wall, install Metal Angles, with the long leg of the angle positioned a minimum of 20mm from the bottom flange. Fix the shorter leg of the angle to the structure with Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide a minimum penetration of 30mm into the substrate.
8. FSi PROMAT Pyrocoustic® Fire Resistant Sealant (minimum 3mm gap between board and wall).

VERMICULUX®-S BEAM ENCASEMENTS
2-SIDED BEAM ENCASEMENT: Z FIX TO STEELWORK



Single Layer



Double Layer

DETAIL 2.5

System Name
ST VLUX-009S: 2 Sided Beam Protection up to 609mm deep and 380mm wide. Board fix to Angle, Z fix to beam. Single and Double Layer.

Fire Performance
Up to 240 minutes

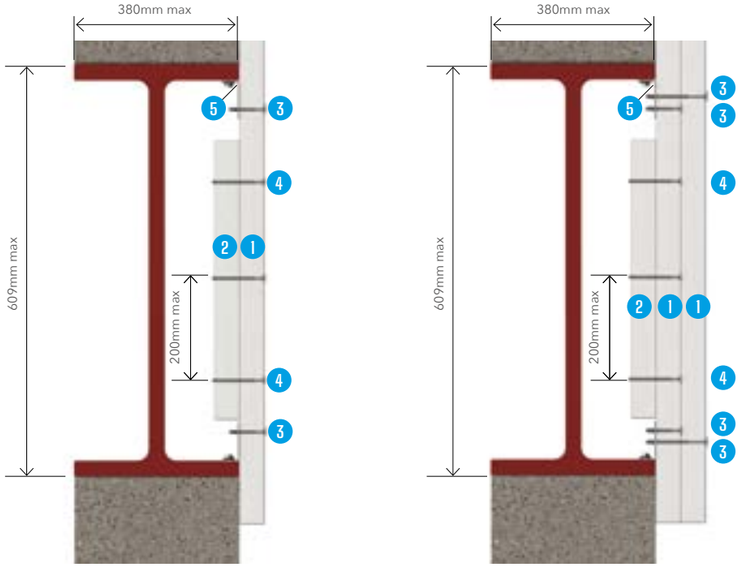
Certification Reference
CF 5757

Drawing Reference
ST VLUX-009 (Single Layer), ST VLUX-012 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange, offset by a minimum of 3mm from the flange edge. Additional metal Z framing is fixed to the underside of the bottom flange to support soffit boards.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Board joints are coincident around the encasement.
   Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixings to metal angles and Z framing: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle/Z.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.
5. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
6. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.
7. Where the beam abuts a concrete or blockwork wall, install Z framing, minimum 25 x 25 x 25 x 0.7mm thick. Fix the top leg of the Z framing to underside of the bottom flange using 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.
8. FSi PROMAT Pyrocoustic® Fire Resistant Sealant (minimum 3mm gap between board and wall).

VERMICULUX®-S BEAM ENCASEMENTS
1-SIDED BEAM ENCASEMENT: ANGLE FIX TO STEELWORK



Single Layer

Double Layer

DETAIL 2.6

System Name
ST VLUX-001S: 1 Sided Beam Protection up to 609mm deep. Board fix to Angle. Single and Double Layer.

Fire Performance
Up to 240 minutes

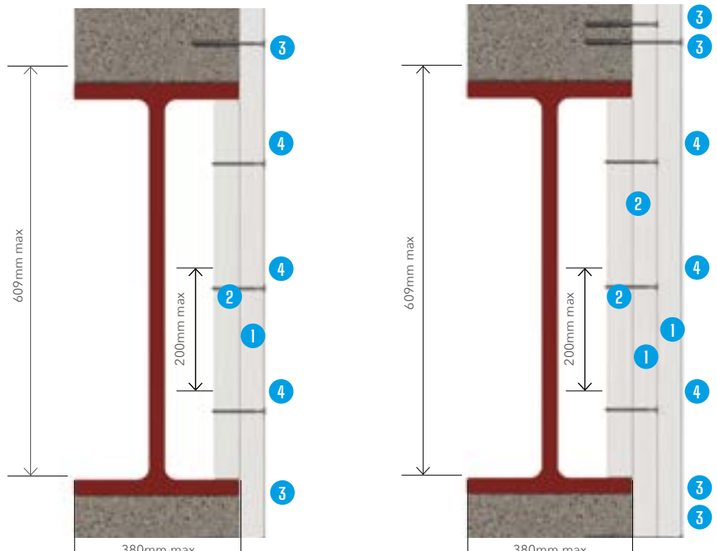
Certification Reference
CF 5757

Drawing Reference
ST VLUX-001 (Single Layer), ST VLUX-005 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange and the top of the bottom steel flange.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Encasement boards must overlap the structure above and below the line of the steel by a minimum of 75mm. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixings to metal angles: M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.
5. Metal Angle minimum 50 x 25 x 0.7mm: Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

VERMICULUX®-S BEAM ENCASEMENTS
1-SIDED BEAM ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE



Single Layer

Double Layer

DETAIL 2.7

System Name
ST VLUX-002S: 1 Sided Beam Protection up to 609mm deep. Board fix to Blockwork or Structural Concrete. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

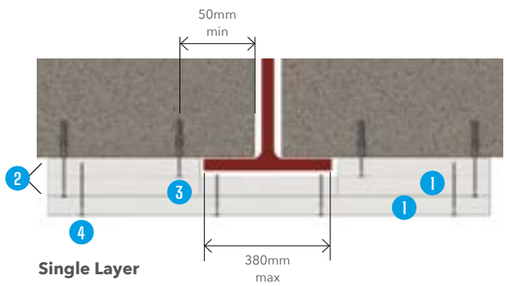
Drawing Reference
ST VLUX-002 (Single Layer), ST VLUX-006 (Double Layer)

Instructions
Encasements are installed by directly fixing the boards to the substrate (concrete/blockwork).

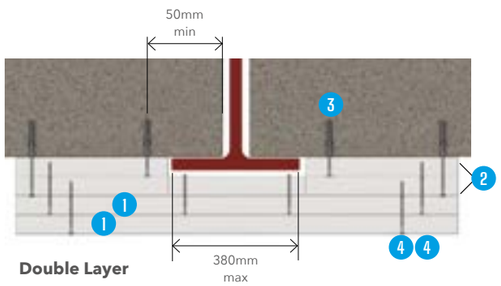
1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Encasement boards must overlap the structure above and below the line of the steel by a minimum of 75mm. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.

VERMICULUX®-S BEAM ENCASEMENTS

1-SIDED BEAM ENCASEMENT: PACKER FIX TO STRUCTURAL CONCRETE



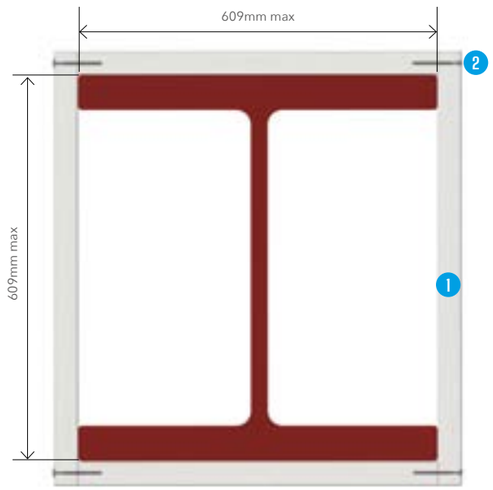
Single Layer



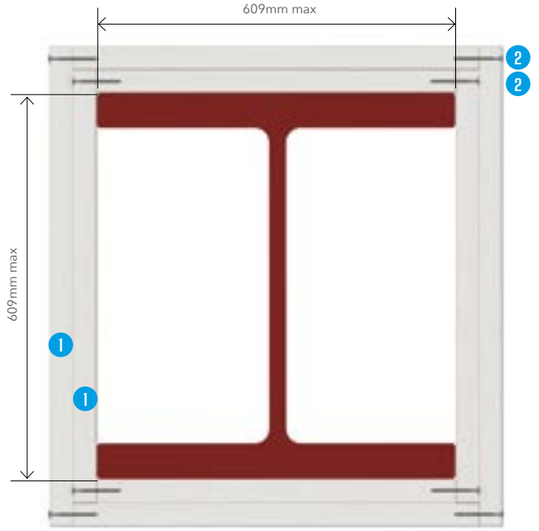
Double Layer

VERMICULUX®-S COLUMN ENCASEMENTS

4-SIDED COLUMN ENCASEMENT: FRAMELESS FIX



Single Layer



Double Layer

DETAIL 2.8

System Name
ST VLUX-004S: 1 Sided Beam Protection up to 380mm wide. Board fix to structure via packers. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

Drawing Reference
ST VLUX-004 (Single Layer), ST VLUX-008 (Double Layer)

Instructions

Encasements are installed by directly fixing the boards to the substrate (concrete soffit).

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Encasement boards must overlap the structure to either side of the steel by a minimum of 75mm. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S or SUPALUX® packer board (greater of: 20mm or thickness of the flange).
3. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
4. Minimum M4 screws into metal plugs: Non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
5. Fixings to coverstrips and encasement boards to packers: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip or packer board.

DETAIL 2.9

System Name
ST VLUX-039S: 4 Sided Column Protection up to 609mm x 609mm. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

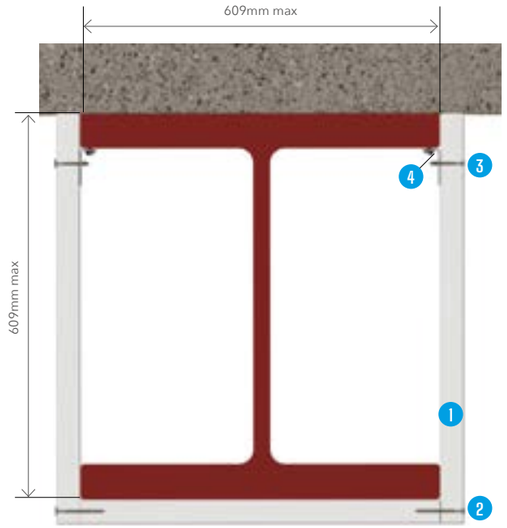
Drawing Reference
ST VLUX-039 (Single Layer), ST VLUX-040 (Double Layer)

Instructions

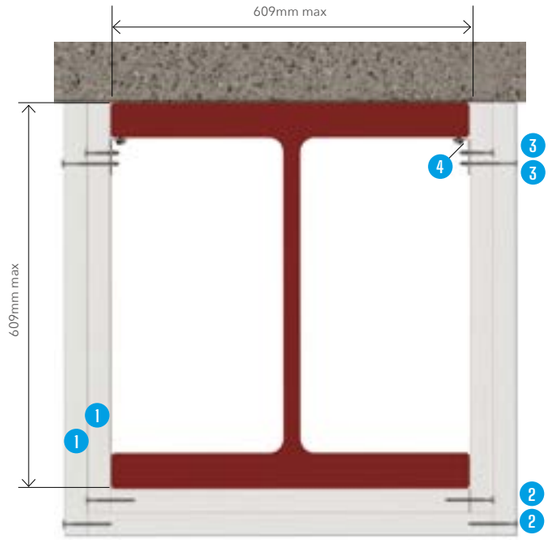
Encasements are installed by edge fixing the boards around the column (Frameless).

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and imiting steel temperature. Board joints on adjacent faces must be staggered by 500mm minimum. Board thicknesses over 35mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Fixing to board edge, Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.

VERMICULUX®-S COLUMN ENCASEMENTS
3-SIDED COLUMN ENCASEMENT: ANGLE FIX

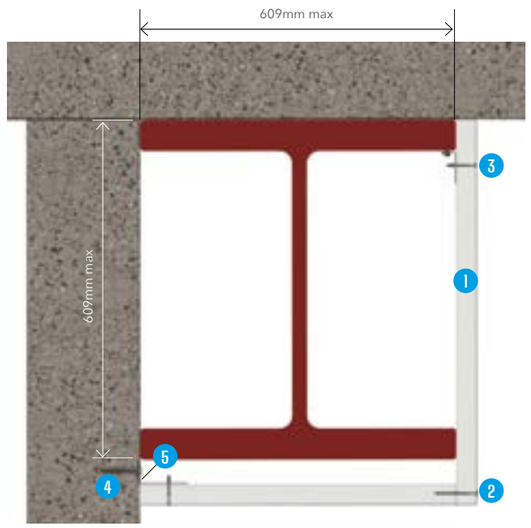


Single Layer

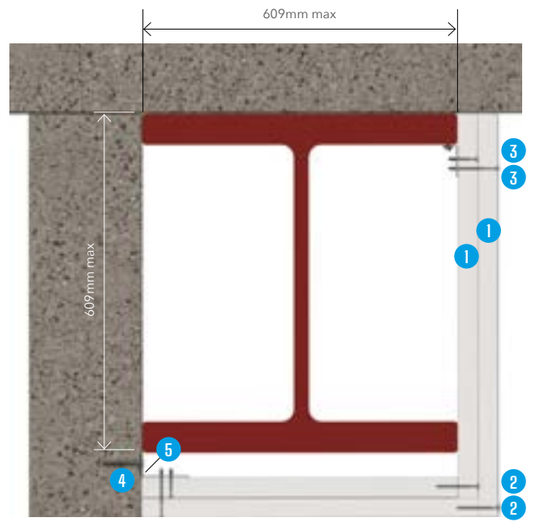


Double Layer

VERMICULUX®-S COLUMN ENCASEMENTS
2-SIDED COLUMN ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE



Single Layer



Double Layer

DETAIL 2.10

System Name
ST VLUX-037S: 3 Sided Column Protection up to 609mm x 609mm. Angle fix. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

Drawing Reference
ST VLUX-037 (Single Layer), ST VLUX-038 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the steel flange.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board joints on adjacent faces must be staggered by 500mm minimum. Board thicknesses over 35mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

DETAIL 2.11

System Name
ST VLUX-032S: 3 Sided Column Protection up to 609mm x 609mm. Board fix to Angle, Angle fix to wall. Single and Double Layer.

Fire Performance
Up to 240 minutes

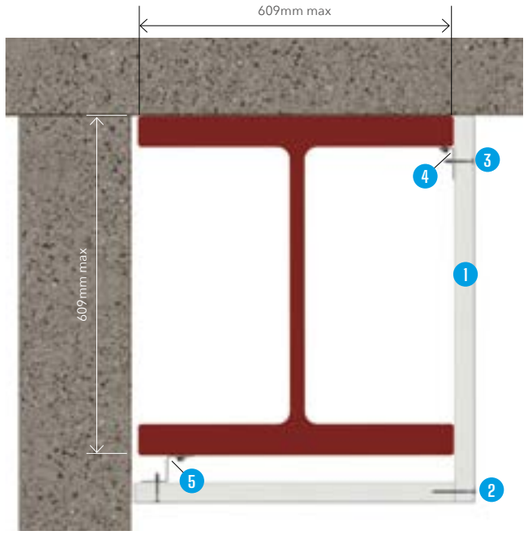
Certification Reference
CF 5757

Drawing Reference
ST VLUX-032 (Single Layer), ST VLUX-035 (Double Layer)

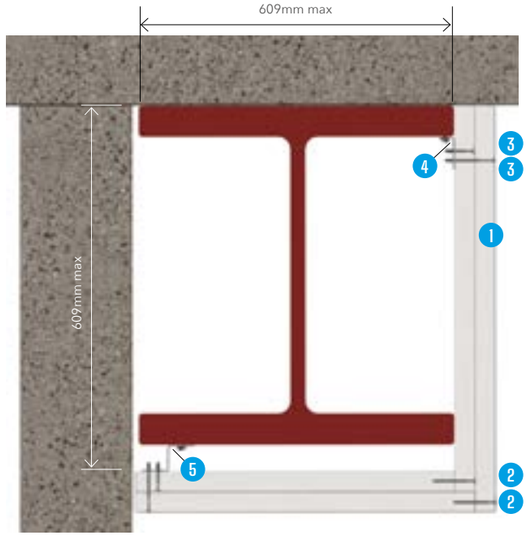
Instructions
Encasements are installed using metal angles fixed to the steel flange, additional metal angle framing is fixed to the substrate to support flange boards.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board joints on adjacent faces must be staggered by 500mm minimum. Board thicknesses over 35mm are installed as a double layer. Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Where the column abuts a concrete or blockwork wall, install Metal Angles. Fix the shorter leg of the angle to the structure with Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide a minimum penetration of 30mm into the substrate.
5. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

VERMICULUX®-S COLUMN ENCASEMENTS
2-SIDED COLUMN ENCASEMENT: BOARD FIX TO ANGLE, Z FIX TO COLUMN



Single Layer



Double Layer

DETAIL 2.12

System Name
ST VLUX-031S: 3 Sided Column Protection up to 609mm x 609mm. Board fix to Angle, Z fix to column. Single and Double Layer.

Fire Performance
Up to 240 minutes

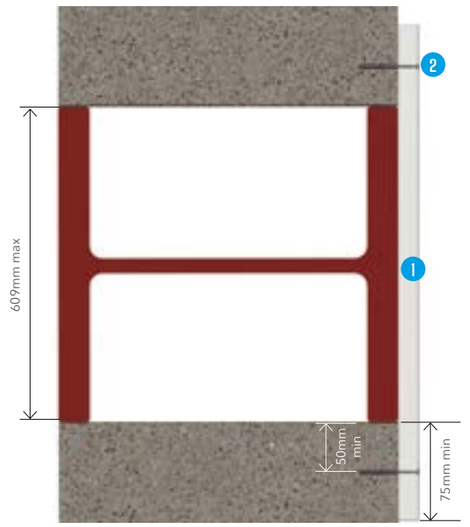
Certification Reference
CF 5757

Drawing Reference
ST VLUX-031 (Single Layer), ST VLUX-034 (Double Layer)

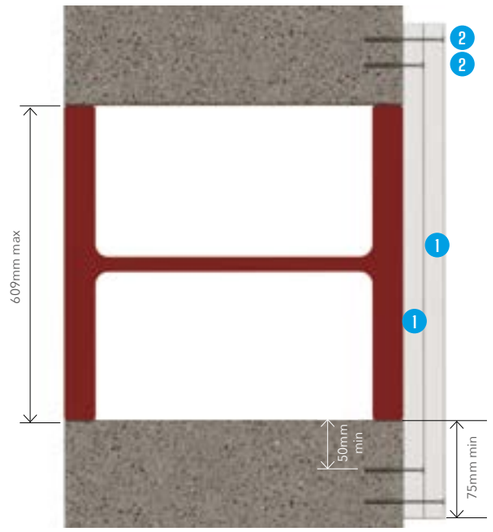
Instructions
Encasements are installed using metal angles fixed to the steel flange. Additional metal Z framing is fixed to the opposite flange to support flange boards.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board joints on adjacent faces must be staggered by 500mm minimum. Board thicknesses over 35mm are installed as a double layer. Double layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
3. Fixings to metal angles and Z framing: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.
5. Metal Z framing: Minimum 25 x 25 x 25 x 0.65mm thick. Metal Z framing fixing to steel: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

VERMICULUX®-S COLUMN ENCASEMENTS
1-SIDED COLUMN ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE (FRAMELESS)



Single Layer



Double Layer

DETAIL 2.13

System Name
ST VLUX-025S: 1 Sided Column Protection up to 609mm wide. Board fix to Blockwork or Structural Concrete. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

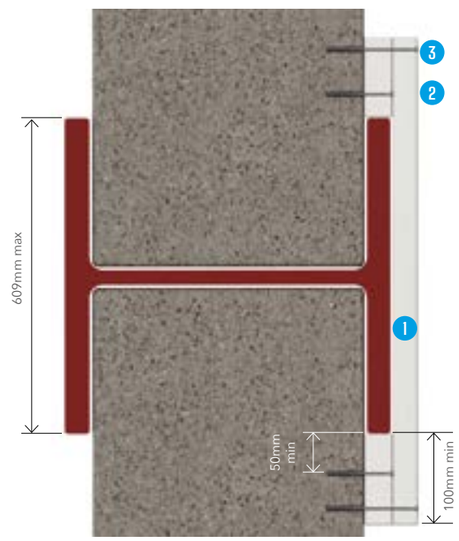
Drawing Reference
ST VLUX-025 (Single Layer), ST VLUX-028 (Double Layer)

Instructions
Encasements are installed by directly fixing the boards to the substrate (concrete/blockwork).

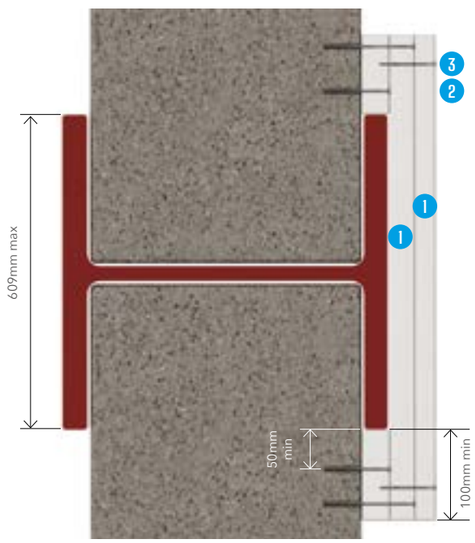
1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 35mm are installed as a double layer. Encasement boards must overlap the structure either side of the steel by a minimum of 75mm. Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.

VERMICULUX®-S COLUMN ENCASEMENTS

1-SIDED COLUMN ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE THROUGH PACKERS (FRAMELESS)



Single Layer



Double Layer

DETAIL 2.14

System Name
ST VLUX-027S: 1 Sided Column Protection up to 609mm wide. Board fix to Blockwork or Structural Concrete through packers. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757

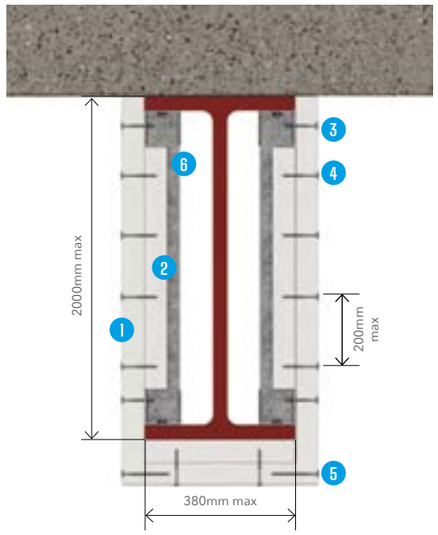
Drawing Reference
ST VLUX-027 (Single Layer), ST VLUX-030 (Double Layer)

Instructions
Where the steel flange is offset from the substrate, encasements are installed using a packer board to either side of the exposed flange.

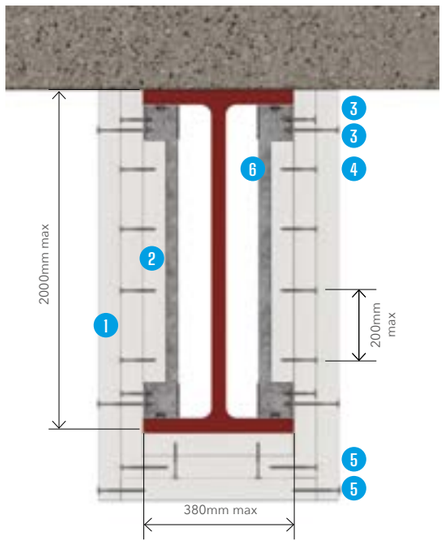
1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 35mm are installed as a double layer. Encasement boards must overlap the structure either side of the steel by a minimum of 100mm. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. Fix minimum 100mm wide Promat VERMICULUX®-S packer board, thickness to suit flange depth, using Minimum M4 screws into metal plugs, non-combustible anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate. Fix inner layer of encasement board, through the packers, in the same manner.
3. Fixings: outer layer of encasement boards to packers: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the packer board.

VERMICULUX®-S DEEP BEAM ENCASEMENTS

3-SIDED DEEP BEAM ENCASEMENT: BOARD TO FRAMED CASING FIX



Single Layer



Double Layer

DETAIL 2.15

System Name
ST VLUX-016S: 3 Sided Beam Protection 609mm to 2000mm deep and 380mm wide. Board to framed casing fix. Single and Double Layer.

Fire Performance
Up to 240 minutes

Certification Reference
CF 5757 & WF 530501

Drawing Reference
ST VLUX-016 (Single Layer), ST VLUX-018 (Double Layer)

Instructions
Encasements are installed using a metal frame consisting of U-Track channels fixed to the underside of the top flanges and the upper side of the bottom flanges of the steel beam. Vertical steel channels are friction fitted into the horizontal channels at 1200mm maximum centres.

1. PROMAT VERMICULUX®-S, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board thicknesses over 35mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 600mm.
2. PROMAT VERMICULUX®-S coverstrip, fitted behind all board joints, minimum 20mm thick x 120mm wide.
3. Fixing to Metal Track and Stud: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the framing.
4. Fixings to coverstrips: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 15mm into the coverstrip.
5. Fixing to Board Edge: Minimum M4 High Thread Screws at maximum 200mm centres. Screw length to provide minimum penetration of 30mm into the board edge.
6. Metal framing: 30mm x 52mm x 30mm x 0.5mm steel U-Track and 36mm x 50mm x 34mm x 0.5mm steel C-Studs. Metal Framing Fixing to flanges: 3.7mm x 16mm Shot-fire nails or M4.2 x 13mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

How to calculate the thickness of fire protection using VERMICULUX®-S for structural steel.

The thickness of VERMICULUX®-S required to achieve the required protection depends on the following factors:

- Period of fire resistance specified.
- The section factor of the steel (A/V) is based on the size of the steel and the number of sides exposed to the fire. The A/V ratios for steel sizes can be manually calculated or looked up in either the tables on pages 68-86 or refer to the ASFP Yellow Book which has most of the standard steel sizes.
- The limiting temperature for the steel as advised by the structural engineer or structural steel frame designer. If this is not available, it is often considered acceptable to use a value of 550°C for mild steel.
- Check if fire compartmentation is required – refer to Table 2.2 for further information.

The following tables are then used to determine the thickness of VERMICULUX®-S to provide the required fire protection period. For all steelwork members the maximum thickness for a single layer application is 35mm.

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 450°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	170	100	70	-	-	20	-
	275	130	85	50	-	25	-
		185	110	60	-	30	-
		275	145	70	-	35	-
			205	80	50	-	20 + 20
			275	100	55	-	-
				125	65	-	25 + 25
				165	75	-	-
				245	90	-	30 + 30
				275	110	-	-
					145	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 500°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	220	120	85	50	-	20	-
	275	165	100	60	-	25	-
		245	130	65	-	30	-
		275	175	75	50	35	-
			270	90	55	-	20 + 20
			275	115	60	-	-
				145	70	-	25 + 25
				205	85	-	-
				275	100	-	30 + 30
					125	-	-
					170	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 550°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	150	100	60	-	20	-
		210	125	70	-	25	-
		275	165	75	50	30	-
			235	90	55	35	-
			275	110	60	-	20 + 20
				140	70	-	-
				195	80	-	25 + 25
				275	95	-	-
					120	-	30 + 30
					160	-	-
					245	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 600°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	180	120	70	-	20	-
		265	145	75	50	25	-
		275	200	90	55	30	-
			275	105	60	35	-
				125	70	-	20 + 20
				165	75	-	-
				250	90	-	25 + 25
				275	110	-	-
					140	-	30 + 30
					200	-	-
					275	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 620°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	195	125	70	-	20	-
		275	155	80	55	25	-
			215	90	60	30	-
			275	120	65	35	-
				135	70	-	20 + 20
				180	80	-	-
				275	95	-	25 + 25
					115	-	-
					150	-	30 + 30
					225	-	-
					275	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 650°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	225	140	75	50	20	-
		275	175	85	55	25	-
			245	100	60	30	-
			275	120	65	35	-
				150	75	-	20 + 20
				205	85	-	-
				275	100	-	25 + 25
					125	-	-
					170	-	30 + 30
					275	-	-

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 350°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
210	100	60	-	-	-	20	-
275	140	80	60	-	-	25	-
	220	105	70	-	-	30	-
	275	150	90	50	-	35	-
		230	115	60	-	-	20 + 20
		275	160	70	-	-	-
			235	85	50	-	25 + 25
			275	105	60	-	-
				135	70	-	30 + 30
				175	85	-	-
				245	100	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 400°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	125	80	55	-	-	20	-
	190	100	70	-	-	25	-
	275	140	85	50	-	30	-
		205	110	55	-	35	-
		275	150	70	-	-	20 + 20
			215	85	50	-	-
			275	100	55	-	25 + 25
				125	65	-	-
				170	80	-	30 + 30
				240	95	-	-
				275	115	-	35 + 35

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 700°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	270	160	85	60	20	-
		275	210	100	65	25	-
			275	115	70	30	-
				140	75	35	-
				180	85	-	20 + 20
				275	95	-	-
					115	-	25 + 25
					150	-	-
					230	-	30 + 30
					275	-	-

FIRE PROTECTION THICKNESS -
VERMICULUX®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 750°C

Fire resistance period (minutes)						Board Thickness (mm)	
30	60	90	120	180	240	Single Layer	Double Layer
275	275	275	185	95	65	20	-
			255	110	70	25	-
			275	130	75	30	-
				160	85	35	-
				220	95	-	20 + 20
				275	110	-	-
					135	-	25 + 25
					185	-	-
					275	-	30 + 30

PROMATECT®-250 is an A1 non-combustible mineral bound light weight calcium silicate board, for internal use in structural steelwork protection and mezzanine floor systems with fire protection of up to 120 minutes.

PROMATECT®-250 has a smooth matt upper surface and is off-white in appearance and can be left untreated or painted. Encasements have a clean, boxed appearance and can be applied to unpainted steelwork. The board is available in a range of thicknesses and can be used in a single or double layer, according to requirements.

PROMATECT®-250 can also accept a decorative finish and therefore be used where aesthetics are important.

The board is classified A1 non-combustible according to BS EN 13501-1. PROMATECT®-250 offers a quick installation solution for the fire protection of structural steel, with up to 120 minutes fire protection being achieved depending on the thickness of material used, the section factor of the beam or column being protected, and the limiting steel temperature for the structural design.

Advantages

- A fully fire tested solution which has been independently assessed by UL, Certificate number UL-EU-01220-CPR, to EN 13381-4: 2013, for fire protection of steel for up to 120 minutes.
- PROMATECT® 250 comprises autoclaved calcium silicate spheres (PROMAXON® is a synthetic hydrated calcium silicate in spherical form) bound in a mineral matrix. PROMAXON® technology provides fire protection in most internal applications.
- High compressive strength: Galvanised steel partition sections can be installed directly up to the face of the board and through fixed to the steel substrate wherever these partition sections abut a solid face of the encased steel profile.
- Lightweight with a board density of 750kg/m³.
- Can be used in either a single or double layer depending on the section factor, limiting steel temperature and fire protection period required.
- Available in 15mm, 20mm and 25mm thicknesses.
- Tested at limiting temperatures from 350°C up to 750°C.
- A simple solution for the protection of windposts, where up to 120 minutes compartmentation is required.

Design considerations

Maintaining Compartmentation

Where fire compartmentation is required as well as fire protection to the steel, fire insulation must be provided across the beam or column to the criteria of BS EN 1363-1 (maintaining fire insulation to average temperature rise of 140°C , maximum temperature 180°C). The minimum thickness of PROMATECT® -250 board **on each side of the beam or column** is determined as follows. The board thickness is first calculated based on the steelwork section factor, limiting steel temperature and fire protection period. The thickness to achieve fire insulation is then taken from the table below. The thicker of the two board options should always be used.

TABLE 2.3 PROMATECT®-250 COMPARTMENTATION THICKNESS*

Fire resistance (minutes)	Board thickness (mm)
60	15
90	20
120	25

***Source: UL-EU-01220-CPR.**

Insulation within encasements: Low density (10-30kg/m³) glass mineral wool only, if required for acoustic or thermal performance.

Fire/smoke-tight seal: All boards abutting surrounding structure to be sealed using FSi PROMAT Pyrocoustic® Fire Resistant Sealant - Designed to seal any slight gaps at interfaces between the boards and the substrate, which have low movement requirements (±7.5%). Contains no solvents or halogen compounds.

Maximum board thickness: PROMATECT®-250 boards are supplied in 15mm, 20mm & 25mm thick formats. All encasements requiring board thicknesses in excess of 25mm thick must be applied in two layers, with the first layer being the thicker of the two where applicable.

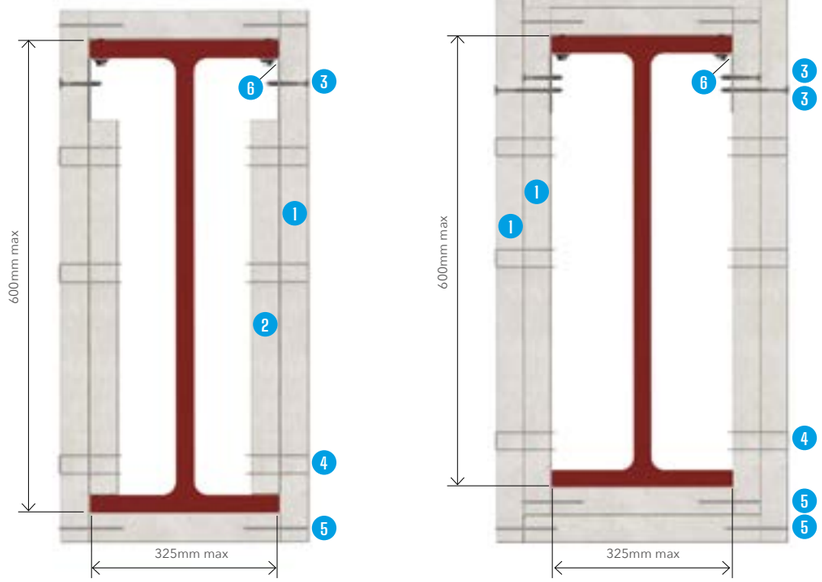
Different Profiles & Fixing Methods

The following pages show Promat's standard PROMATECT®-250 solutions for the protection of I-section beams and H-section columns, with maximum permissible dimensions for each arrangement noted. The results for I/H-sections can be applied to hot-formed angles, channels and T-sections with the same section factor, using the same fixing method. Alternative structural steel profiles, such as square, rectangular and circular hollow sections can also be catered for, but may require different framing and fixing methods. For further details of these alternative steel profiles and fixing methods, please contact Promat's Technical Services Department.

PROMATECT®-250 is used to provide one, two, three or four sided encasements to:

- Universal columns and beams (I or H-sections) and joists
- Beams supporting composite floors with profiled metal decking
- Structural hollow sections
- Partially exposed members
- Lattice beams
- Windposts
- Bracing

PROMATECT®-250 BEAM ENCASEMENTS
4-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer Double Layer

DETAIL 2.16

System Name
ST P250-029S: 4 Sided Beam Protection up to 600mm deep and 325mm wide. Angle fix. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

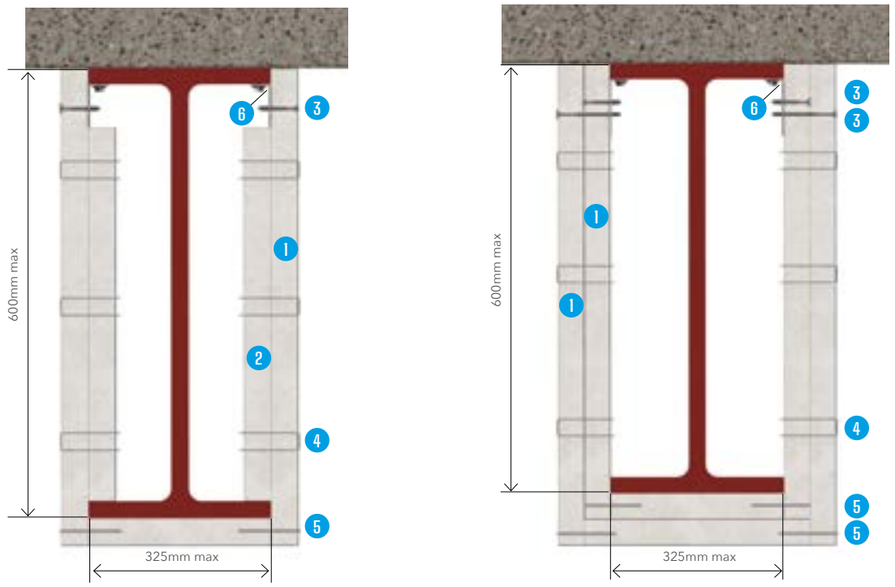
Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-029 (Single Layer), ST P250-032 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1250mm. Board thicknesses over 25mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 530mm. Coverstrips are not required behind vertical board joints in double layer encasements.
2. PROMAT PROMATECT®-250 coverstrip, fitted behind all vertical board joints, minimum 100mm wide x encasement board thickness (Single Layer encasements only).
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips (Single Layer), fixings between board layers either side of vertical board joints (Double Layer): Chisel Point Staples 35x12x1.6mm at maximum 150mm centres. (50x12.5x1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Fixings to Board Edge: Chisel Point Staples 35x12x1.6mm at maximum 150mm centres. (50x12.5x1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
6. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.

PROMATECT®-250 BEAM ENCASEMENTS
3-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer Double Layer

DETAIL 2.17

System Name
ST P250-015S: 3 Sided Beam Protection up to 600mm deep and 325mm wide. Angle fix. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

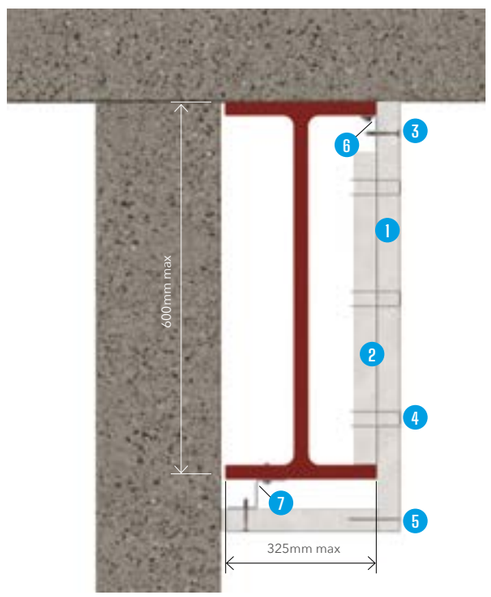
Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-015 (Single Layer), ST P250-017 (Double Layer)

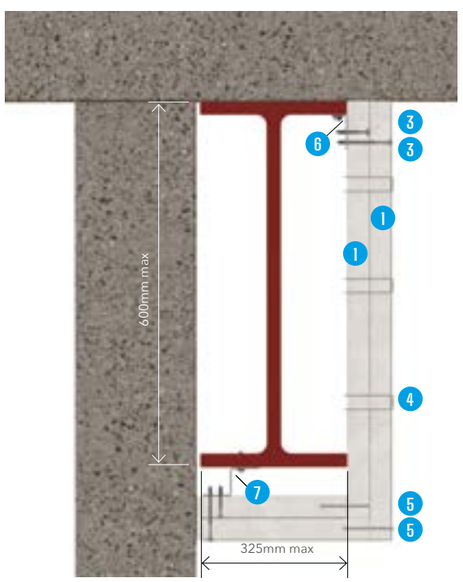
Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1250mm. Board thicknesses over 25mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 530mm. Coverstrips are not required behind vertical board joints in double layer encasements.
2. PROMAT PROMATECT®-250 coverstrip, fitted behind all vertical board joints, minimum 100mm wide x encasement board thickness (Single Layer encasements only).
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips (Single Layer) and fixings between board layers either side of vertical board joints (Double Layer): Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
6. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.

PROMATECT®-250 BEAM ENCASEMENTS
2-SIDED BEAM ENCASEMENT: Z FIX TO STEELWORK



Single Layer



Double Layer

DETAIL 2.18

System Name

ST P250-009S: 2 Sided Beam Protection up to 600mm deep and 325mm wide. Board fix to Angle, Z fix to beam. Single and Double Layer.

Fire Performance

Up to 120 minutes in accordance with BS EN 13381-4

Certification Reference

UL-EU-01220-CPR

Drawing Reference

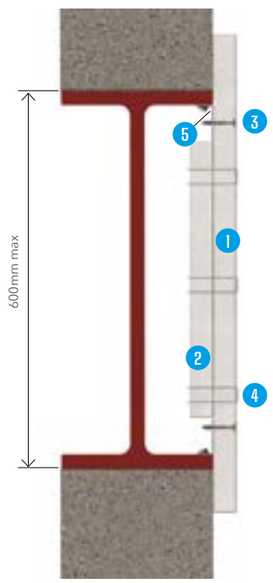
ST P250-009 (Single layer), ST P250-012 (Double layer)

Instructions

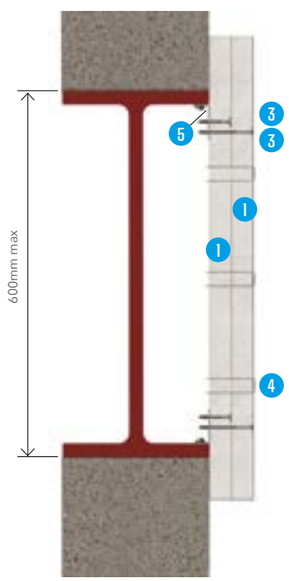
Encasements are installed using metal angles fixed to the underside of the top steel flange. Additional metal Z framing is fixed to the underside of the bottom flange to support soffit boards.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1250mm. Board thicknesses over 25mm are installed as a double layer. Board joints are coincident around the encasement. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 530mm. Coverstrips are not required behind vertical board joints in double layer encasements.
2. PROMAT PROMATECT®-250 coverstrip, fitted behind all vertical board joints, minimum 100mm wide x encasement board thickness (Single Layer encasements only).
3. Fixings to metal angles and Z framing: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle/Z.
4. Fixings to coverstrips (Single layer) and fixings between board layers either side of vertical board joints (Double layer): Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Fixings to Board Edge: Chisel Point Staples 35x12x1.6mm at maximum 150mm centres. (50x12.5x1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
6. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.
7. Metal Z framing: Minimum 25 x 25 x 25 x 1.2mm thick. Metal Z framing fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 200mm centres.

PROMATECT®-250 BEAM ENCASEMENTS
1-SIDED BEAM ENCASEMENT: BOARD FIXED TO ANGLE



Single Layer



Double Layer

DETAIL 2.19

System Name

ST P250-001S: 1 Sided Beam Protection up to 600mm deep. Board fix to Angle. Single and Double Layer.

Fire Performance

Up to 120 minutes in accordance with BS EN 13381-4

Certification Reference

UL-EU-01220-CPR

Drawing Reference

ST P250-001 (Single Layer), ST P250-005 (Double Layer)

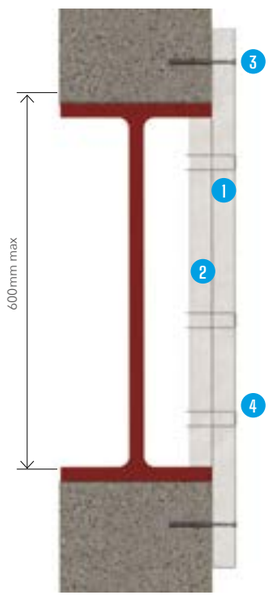
Instructions

Encasements are installed using metal angles fixed to the underside of the top steel flange and top of the bottom steel flange.

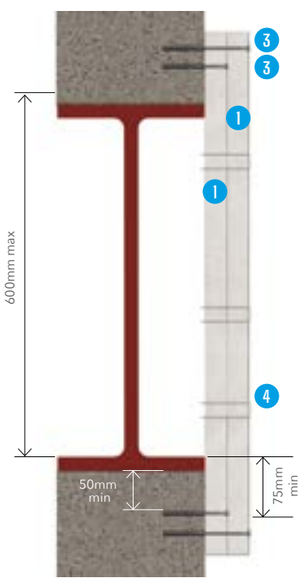
1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1250mm. Board thicknesses over 25mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 530mm. Coverstrips are not required behind vertical board joints in double layer encasements.
2. PROMAT PROMATECT®-250 coverstrip, fitted behind all vertical board joints, minimum 100mm wide x encasement board thickness (Single Layer encasements only).
3. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
4. Fixings to coverstrips (Single Layer) and fixings between board layers either side of vertical board joints (Double Layer): Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.

PROMATECT®-250 BEAM ENCASEMENTS

1-SIDED BEAM ENCASEMENT: FIXED TO BLOCKWORK OR STRUCTURAL CONCRETE (FRAMELESS)



Single Layer



Double Layer

DETAIL 2.20

System Name
ST P250-002S: 1 Sided Beam Protection up to 600mm deep. Fixed to the substrate (concrete/blockwork). Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

Certification Reference
UL-EU-01220-CPR

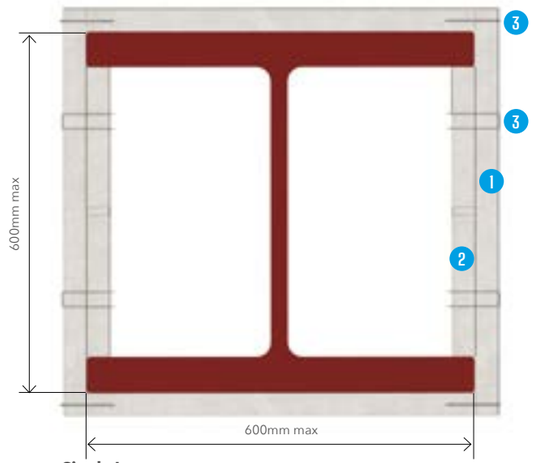
Drawing Reference
ST P250-002 (Single Layer), ST P250-06 (Double Layer)

Instructions
Encasements are installed by directly fixing the boards to the substrate (concrete/blockwork).

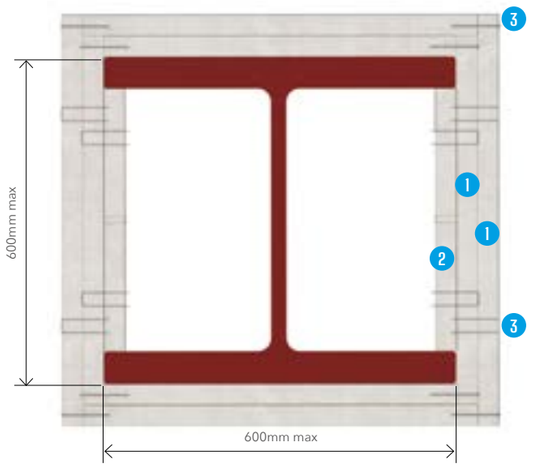
1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1250mm. Board thicknesses over 25mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement, the thicker layer should be applied first. The joints between layers must be staggered by minimum 530mm. Coverstrips are not required behind vertical board joints in double layer encasements.
2. PROMAT PROMATECT®-250 coverstrip, fitted behind all vertical board joints, minimum 100mm wide x encasement board thickness (Single Layer encasements only).
3. Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
4. Fixings to coverstrips (Single Layer) and fixings between board layers either side of vertical board joints (Double Layer): Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.

PROMATECT®-250 COLUMN ENCASEMENTS

4-SIDED COLUMN ENCASEMENT: FRAMELESS FIX



Single Layer



Double Layer

DETAIL 2.21

System Name
ST P250-053S: 4 Sided Column Protection up to 600mm x 600mm. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

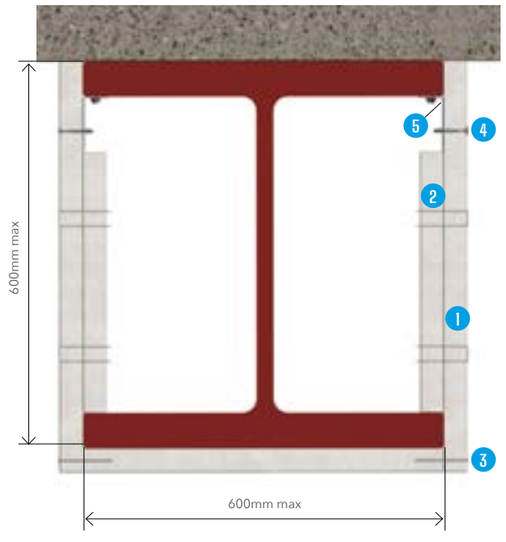
Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-053 (Single Layer), ST P250-054 (Double Layer)

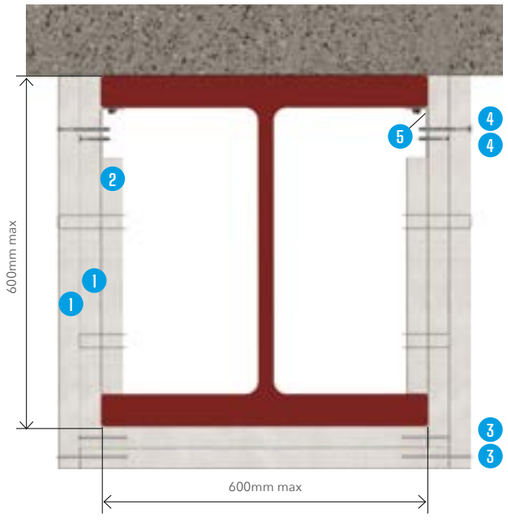
Instructions
Encasements are installed by edge fixing the boards around the column (Frameless).

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 25mm are installed as a double layer. Board joints are staggered by 530mm minimum on adjacent faces. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 530mm. Soldiers are not required but are recommended at the head and base of the column for additional stability.
2. PROMAT PROMATECT®-250 soldiers, 100mm wide x casing thickness, divided in half with a sloping cut and wedged into position between steel flanges at head and base of the encasement (Optional/recommended).
3. Fixing to Board Edge and Fixings to soldiers: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.

PROMATECT®-250 COLUMN ENCASEMENTS
3-SIDED COLUMN ENCASEMENT: ANGLE FIX

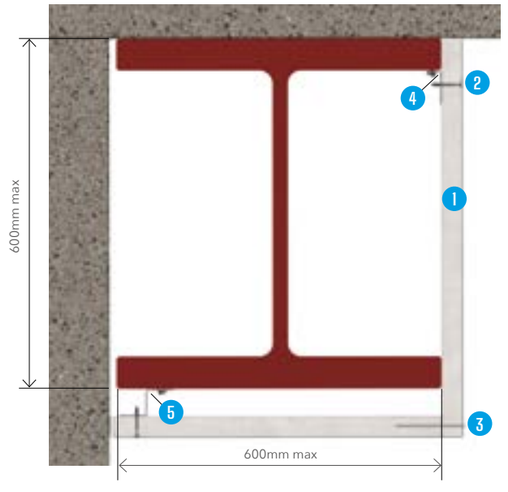


Single Layer

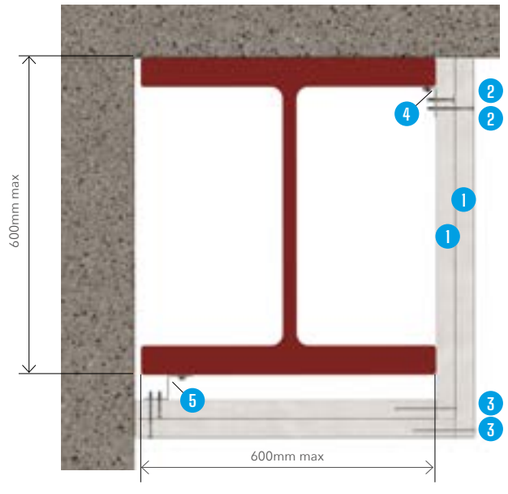


Double Layer

PROMATECT®-250 COLUMN ENCASEMENTS
2-SIDED COLUMN ENCASEMENT: Z FIX TO STEELWORK



Single Layer



Double Layer

DETAIL 2.22

System Name
ST P250-049S: 3 Sided Column Protection up to 600mm x 600mm, angle fix. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-049 (Single Layer), ST P250-051 (Double Layer)

Instructions
Encasements are installed using metal angles fixed to the steel flanges.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 25mm are installed as a double layer. Board joints are staggered by 530mm minimum on adjacent faces. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 530mm. Soldiers are not required but are recommended at the head and base of the column for additional stability.
2. PROMAT PROMATECT®-250 coverstrips, 100mm wide x casing thickness, at head and base of the encasement (Optional/ recommended).
3. Fixing to Board Edge and Fixings to soldiers: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
4. Fixings to metal angles: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle.
5. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.

DETAIL 2.23

System Name
ST P250-043S: 2 Sided Column Protection up to 600mm x 600mm wide. Board fix to Angle, Z fix to column. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

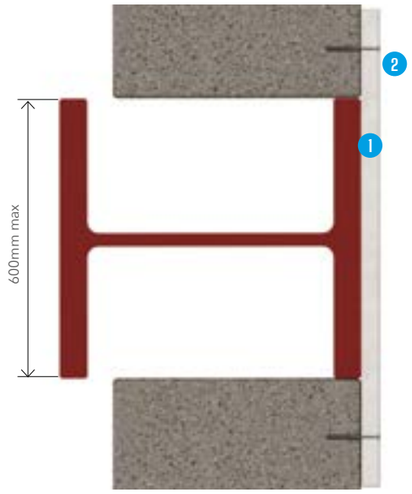
Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-043 (Single Layer), ST P250-046 (Double Layer)

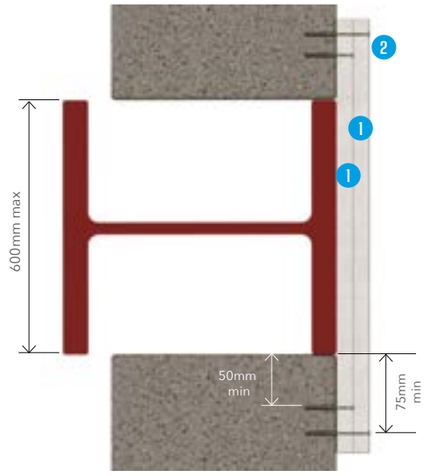
Instructions
Encasements are installed using metal angles fixed to the steel flange. Additional metal Z framing is fixed to the opposite flange to support flange boards.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 25mm are installed as a double layer. Board joints are staggered by 530mm minimum on adjacent faces. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 530mm.
2. Fixings to metal angles and Z framing: Minimum M4 CSK Self Tapping Screws at maximum 200mm centres. Screw length to provide minimum penetration of 10mm through the angle/Z.
3. Fixing to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
4. Metal Angle minimum 50 x 25 x 0.5mm. Metal Angle Fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.
5. Metal Z framing: Minimum 25 x 25 x 25 x 1.2mm thick. Metal Z framing fixing to steel: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 500mm centres.

PROMATECT®-250 COLUMN ENCASEMENTS
1-SIDED COLUMN ENCASEMENT: BOARD FIX TO BLOCKWORK OR STRUCTURAL CONCRETE



Single Layer



Double Layer

DETAIL 2.24

System Name
ST P250-035S: 1 Sided Column Protection up to 600mm wide. Board fix to Blockwork or Structural Concrete. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

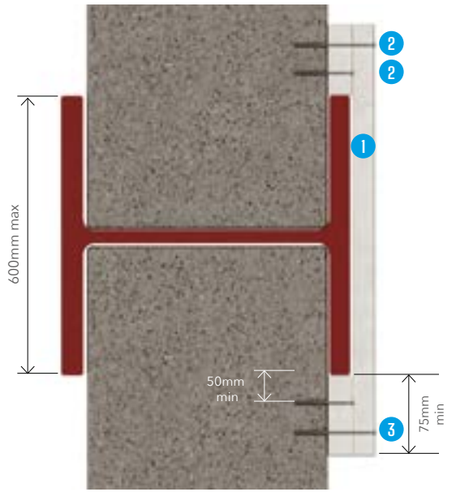
Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-035 (Single Layer), ST P250-039 (Double Layer)

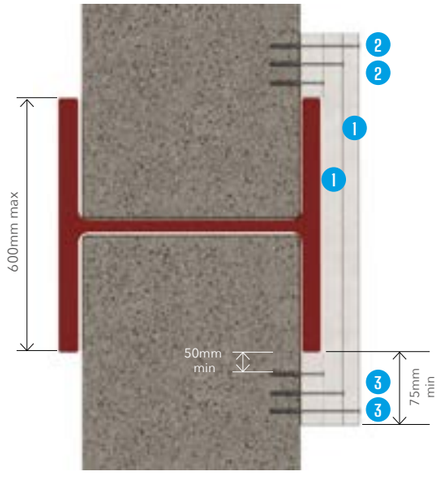
Instructions
Encasements are installed by directly fixing the boards to the substrate (concrete/blockwork).

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 25mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 530mm.
2. Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.

PROMATECT®-250 COLUMN ENCASEMENTS
1-SIDED COLUMN ENCASEMENT: BOARD FIX TO BLOCKWORK OR STRUCTURAL CONCRETE THROUGH PACKERS



Single Layer



Double Layer

DETAIL 2.25

System Name
ST P250-037S: 1 Sided Column Protection up to 600mm wide. Board fix to Blockwork or Structural Concrete through packers. Single and Double Layer.

Fire Performance
Up to 120 minutes in accordance with BS EN 13381-4

Certification Reference
UL-EU-01220-CPR

Drawing Reference
ST P250-037 (Single Layer), ST P250-041 (Double Layer)

Instructions
Where the steel flange is offset from the substrate, encasements are installed using a packer board to either side of the exposed flange.

1. PROMAT PROMATECT®-250, board thickness determined by section factor (A/V), fire resistance period and limiting steel temperature. Board thicknesses over 25mm are installed as a double layer. Double Layer encasements: Where more than one layer of board is used in an encasement. The joints between layers must be staggered by minimum 530mm.
2. Fix minimum 100mm wide PROMAT PROMATECT®-250 packer board, thickness to suit flange depth, using Minimum M4 screws into metal plugs, non-combustible anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
3. Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.

PROMATECT®-250 WINDPOSTS

Windposts are typically used as lateral restraint for structural walls and, as such, board thickness selection is based on maintaining compartmentation across the line of the steel, rather than load-bearing capacity.

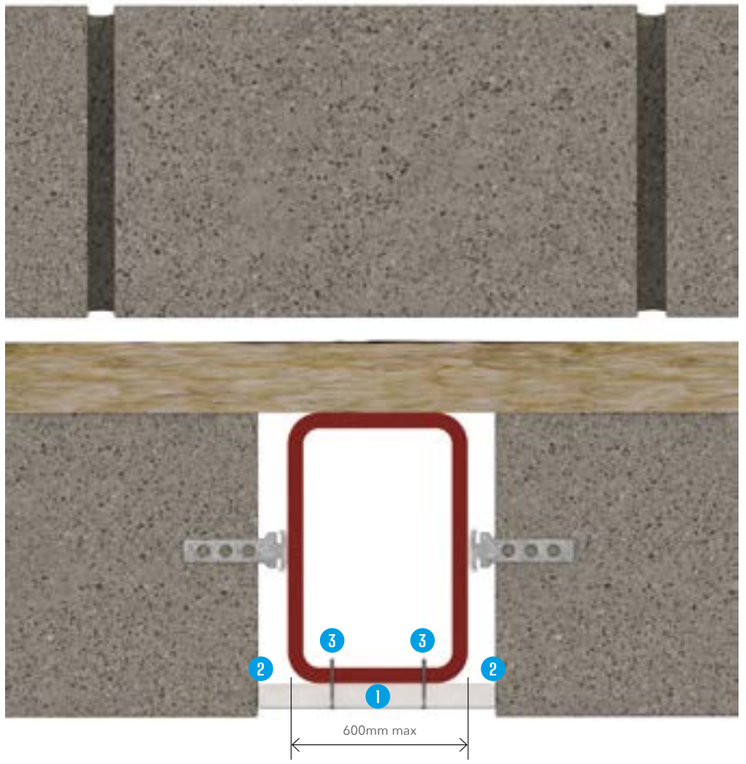
Wind posts are a common way of providing lateral support to tall masonry walls in modern steel-framed buildings. In situations where the walls are also required to provide fire resistance between two compartments (or at a boundary position), the fire protection applied to the wind posts must also maintain the fire separation across the wall construction at that point. That is, in addition to providing fire protection to the steel to a limiting temperature, it must also be capable of maintaining the wall fire integrity and fire insulation requirements of 140°C mean rise and 180°C maximum spot temperature rise above ambient conditions, to the unexposed face.

The board thicknesses for compartmentation may be in excess of those required to provide protection to a limiting steel temperature.

For cold rolled sections the thickness of board may need to increase because of either a higher A/V value, or lower limiting temperature and it is important that these checks are completed by a competent person.

Refer to tabulated data within Certificate UL-EU-01220-CPR, available for download from the Promat website. PROMAT PROMATECT®-250 can be installed in 1, 2 and 3 sided configurations to wind posts, with a number of different fixing options available to suit site conditions and the wind post profiles. Details of each of these options are included below.

PROMATECT®-250 WINDPOSTS
1-SIDED WINDPOST ENCASEMENT: BOARD FIX TO RECESSED STEEL



DETAIL 2.26

System Name
WP P250-001S (Fixing Option 1): 1 Sided Windpost Protection up to 600mm wide. Board fix to recessed steel.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-001

When wind posts are incorporated into the inner leaf of an external wall, the outer masonry leaf will normally provide the fire separation required (any insulation to the cavity should be non-combustible). The protection to the wind post under these circumstances may be regarded as a normal 1-sided steel section exposure. The wind post will normally require fire protection for the same fire resistance period as the supported separating wall. Fire attack will normally be considered to occur from the inner face only. Under these circumstances the thickness of PROMATECT®-250 required to maintain fire separation across the wall will usually be greater than the thickness required simply to protect the steel alone.

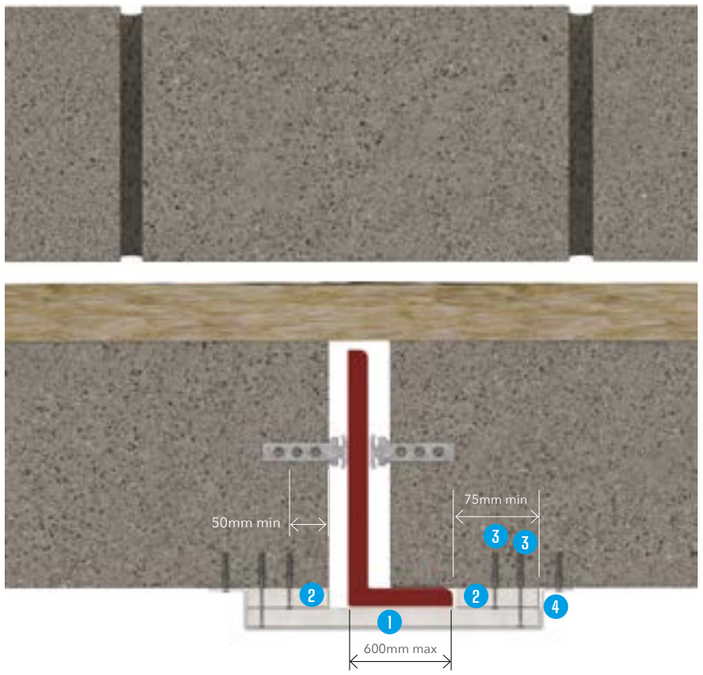
Instructions
Where the exposed face of the steel windpost is recessed into the structural wall, encasements are installed using a direct fix to the exposed face of the steel profile.

1. PROMAT PROMATECT®-250 Board thickness is determined according to the requirements to maintain compartmentation, see selection table below.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the windpost)	15mm	20mm	25mm

2. FSi PROMAT PYROCOUSTIC® Fire Resistant Sealant (minimum 3mm gap between board and wall).
3. Fixings to windpost: M4 self-drilling/self-tapping screws or minimum 3.6mm shot fired nails at nominal 300mm centres. Fixing length to give a minimum penetration of 10mm beyond interface with steel.

PROMATECT®-250 WINDPOSTS
1-SIDED WINDPOST ENCASEMENT: BOARD FIX THROUGH PACKERS



DETAIL 2.27

System Name
WP P250-001S (Fixing Option 2): 1 Sided Windpost Protection up to 600mm wide. Board fix through packers.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-001

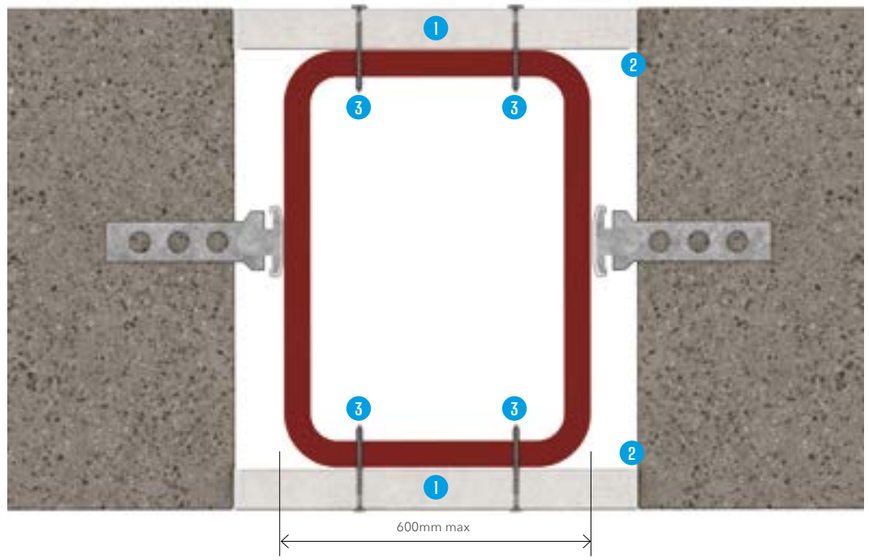
Instructions
Where the exposed face of the steel windpost is offset from the substrate, encasements are installed using a packer board to either side of the exposed face.

1. PROMAT PROMATECT®-250 PROMAT PROMATECT®-250 Board thickness is determined according to the requirements to maintain compartmentation, see selection table below.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the wind post)	15mm	20mm	25mm

2. 75mm wide Promat PROMATECT®-250 packers fixed either side of the structural wall opening. Thickness to maintain minimal gap to Windpost.
3. Fixings to structural wall: Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
4. Lightweight metal flashing (By others, optional for impact protection).

PROMATECT®-250 WINDPOSTS
2-SIDED WINDPOST ENCASEMENT: BOARD FIX TO RECESSED STEEL



DETAIL 2.28

System Name
WP P250-002S (Fixing Option 1): 2 Sided Windpost Protection up to 600mm wide. Board fix to recessed steel.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-002

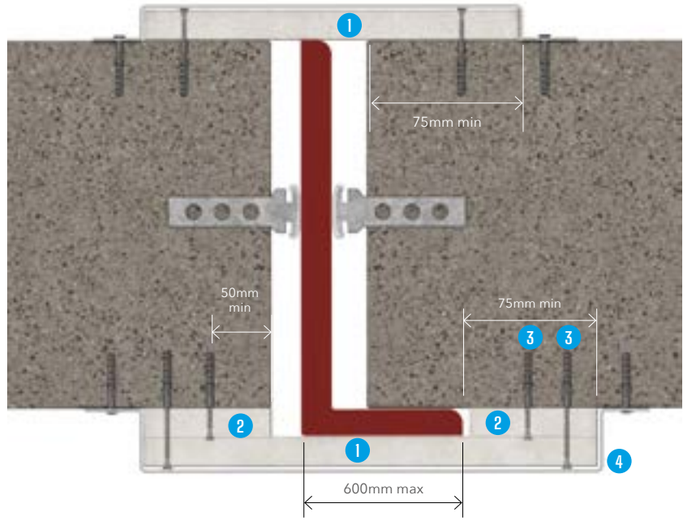
Instructions
Where the exposed faces of the steel windpost are recessed into the structural wall, encasements are installed using a direct fix to the exposed face of the steel profile.

1. PROMAT PROMATECT®-250 Board thickness is determined according to the requirements to maintain compartmentation, see selection table below.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the wind post)	15mm	20mm	25mm

2. FSi PROMAT Pyrocoustic® Fire Resistant Sealant (minimum 3mm gap between board and wall).
3. Fixings to windpost: M4 self-drilling/self-tapping screws or minimum 3.6mm shot fired nails at nominal 300mm centres. Fixing length to give a minimum penetration of 10mm beyond interface with steel.

PROMATECT®-250 WINDPOSTS
2-SIDED WINDPOST ENCASEMENT: BOARD FIX THROUGH PACKERS/DIRECT FIX TO STRUCTURAL WALL



DETAIL 2.29

System Name
WP P250-002S (Fixing Option 2): 2 Sided Windpost Protection up to 600mm wide. Board fix through packers/direct fix to structural wall.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-002

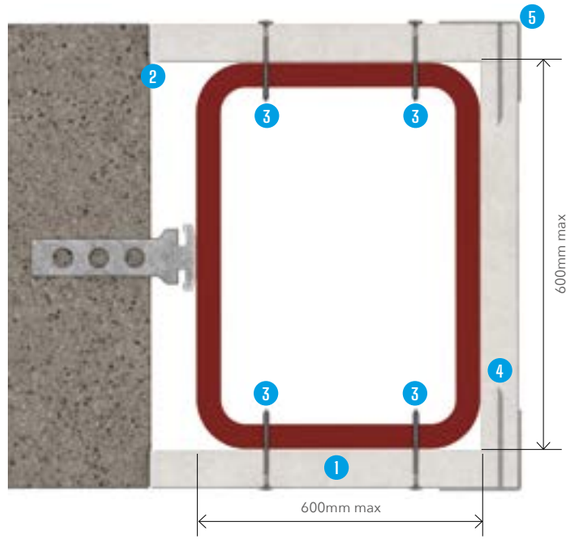
Instructions
Where the exposed faces of the steel windpost are offset from the structural wall, encasements are installed using a packer board to either side of the exposed face. Where the exposed faces of the steel windpost are flush with the structural wall, encasements are installed using board direct fixed to the wall, overlapping the opening in the wall by a minimum of 75mm on both sides.

1. PROMAT PROMATECT®-250, board thickness is determined according to the requirements to maintain compartmentation, see selection table below.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the wind post)	15mm	20mm	25mm

2. 75mm wide Promat PROMATECT®-250 packers fixed either side of the structural wall opening. Thickness to maintain minimal gap to Windpost.
3. Fixings to structural wall: Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
4. Lightweight metal flashing (By others, optional for impact protection).

PROMATECT®-250 WINDPOSTS
3-SIDED WINDPOST ENCASEMENT: BOARD FIX TO RECESSED STEEL



DETAIL 2.30

System Name
WP P250-003S (Fixing Option 1): 3 Sided Windpost Protection up to 600mm x 600mm. Board fix to recessed steel.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-003

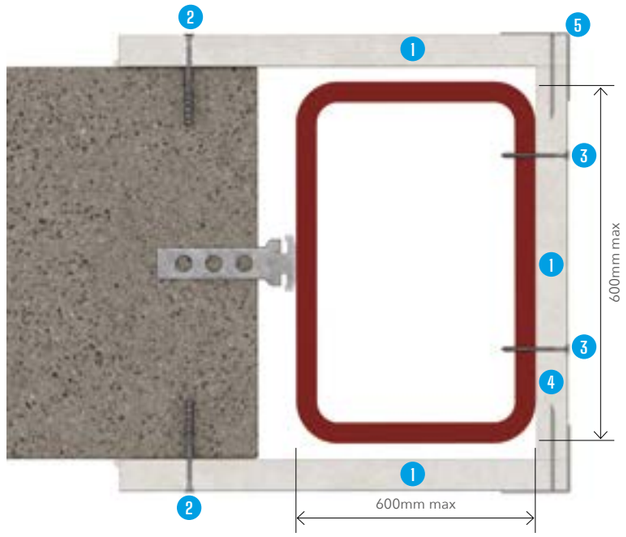
Instructions
Where three exposed faces of the steel windpost allow for a full encasement board width overlap with the structural wall, encasements are installed using a direct fix to the exposed face of the steel profile. Boards are edge stapled to each other around the windpost.

1. Compartmentation thickness may not be enough with 3-sided exposure.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the wind post)	15mm	20mm	25mm

2. FSi PROMAT PYROCOUSTIC® Fire Resistant Sealant (minimum 3mm gap between board and wall).
3. Fixings to windpost: M4 self-drilling/self-tapping screws or minimum 3.6mm shot fired nails at nominal 300mm centres. Fixing length to give a minimum penetration of 10mm beyond interface with steel.
4. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Lightweight angle corner protection (Optional, by others).

PROMATECT®-250 WINDPOSTS
3-SIDED WINDPOST ENCASEMENT: DIRECT FIX TO STRUCTURAL WALL



DETAIL 2.31

System Name
WP P250-003S (Fixing Option 2): 3 Sided Windpost Protection up to 600mm x 600mm. Direct fix to structural wall.

Fire Performance
Up to 120 minutes

Certification Reference
UL-EU-01220-CPR

Drawing Reference
WP P250-003

Instructions
Where three exposed faces of the steel windpost don't allow for a full encasement board width overlap with the structural wall, as per Fixing Option 1, encasements are installed using boards direct fixed to the front and back faces of the wall, overlapping the edges of the wall by a minimum of 75mm on both sides. Additional screws are used to direct fix the third side encasement boards to the windpost. Boards are edge stapled to each other around the windpost.

1. The minimum thickness of PROMATECT® -250 board on each side of the windpost is determined as follows. The board thickness is first calculated based on the steelwork section factor, limiting steel temperature and fire protection period. The thickness to achieve fire insulation is then taken from the table below. The thicker of the two board options should always be used.

Fire period	60 mins	90 mins	120 mins
Board thickness (fixed to the exposed face of the wind post)	15mm	20mm	25mm

2. Fixings to structural wall: Minimum M4 screws into metal plugs, non-combustible concrete anchors or concrete screws at maximum 300mm centres. Fixing length to provide minimum penetration of 30mm into the substrate.
3. Fixings to windpost: M4 self-drilling/self-tapping screws or minimum 3.6mm shot fired nails at nominal 300mm centres. Fixing length to give a minimum penetration of 10mm beyond interface with steel
4. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 150mm centres. (50 x 12.5 x 1.6mm for boards over 15mm thick). The end staples are located nominally 40mm from the corner of the board.
5. Lightweight metal flashing (By others, optional for impact protection).

PROMAT PROMATECT®-250
STEELWORK PROTECTION AND MEZZANINE FLOOR APPLICATION

How to calculate the thickness of fire protection using PROMATECT®-250 for structural steel.

The thickness of PROMATECT®-250 required to achieve this depends on the following factors:

- Period of fire resistance specified.
- The section factor of the steel (A/V) is based on the size of the steel and the number of sides exposed to the fire. The A/V ratios for steel sizes can be manually calculated or looked up in either the tables on pages 68 to 86 or refer to the ASFP Yellow Book which have most of the standard steel sizes.
- The limiting temperature for the steel as advised by the structural engineer or structural steel frame designer. If this is not available, it is often considered acceptable to use a value of 550°C for mild steel.
- Check if fire compartmentation is required – refer to Table 2.3 for further information.

The following tables are then used to determine the thickness of PROMATECT®-250 to provide the required fire protection period. For all steelwork members the maximum thickness for a single layer application is 25mm.

FIRE PROTECTION THICKNESS – PROMATECT®-250 A/V RATIO FOR BEAMS & COLUMNS ENCASEMENTS

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 350°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	250	65	-	-	15	-
	350	115	60	-	20	-
		190	85	55	25	-
		350	120	70	-	15 + 15
			205	95	-	15 + 20
			350	140	-	20 + 20
				240	-	20 + 25
				350	-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 400°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	80	-	-	15	-
		140	70	-	20	-
		245	105	70	25	-
		350	170	90	-	15 + 15
			305	120	-	15 + 20
			350	180	-	20 + 20
				325	-	20 + 25
				350	-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 450°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	95	50	-	15	-
		175	85	55	20	-
		305	125	80	25	-
		350	205	100	-	15 + 15
			350	135	-	15 + 20
				190	-	20 + 20
				310	-	20 + 25
				350	-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 500°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	115	55	-	15	-
		220	100	65	20	-
		350	155	95	25	-
			265	115	-	15 + 15
			350	150	-	15 + 20
				200	-	20 + 20
				315	-	20 + 25
				350	-	25 + 25

PROMATECT®-250

FIRE PROTECTION THICKNESS – PROMATECT®-250 A/V RATIO FOR BEAMS & COLUMNS ENCASEMENTS

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 550°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	135	65	-	15	-
		280	120	75	20	-
		350	185	110	25	-
			350	140	-	15 + 15
				175	-	15 + 20
				235	-	20 + 20
				350	-	20 + 25
					-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 600°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	165	75	50	15	-
		350	140	85	20	-
			220	125	25	-
			350	170	-	15 + 15
				215	-	15 + 20
				290	-	20 + 20
				350	-	20 + 25
					-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 650°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	255	85	55	15	-
		350	160	95	20	-
			260	145	25	-
			350	230	-	15 + 15
				290	-	15 + 20
				350	-	20 + 20
					-	20 + 25
					-	25 + 25

FIRE PROTECTION THICKNESS -
PROMATECT®-250 A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 700°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	255	100	60	15	-
		350	190	110	20	-
			310	165	25	-
			350	340	-	15 + 15
				350	-	15 + 20
					-	20 + 20
					-	20 + 25
					-	25 + 25

FIRE PROTECTION THICKNESS -
VERMICULUM®-S A/V RATIO FOR COLUMNS AND BEAMS

LIMITING STEEL TEMPERATURE 750°C

A/V RATIO	Fire resistance period (minutes)				Board Thickness (mm)	
	30	60	90	120	Single Layer	Double Layer
	350	325	115	70	15	-
		350	220	125	20	-
			350	190	25	-
				350	-	15 + 15
					-	15 + 20
					-	20 +20
					-	20 + 25
					-	25 + 25

PROMATECT®-XW

PROMATECT®-XW is an A1 non-combustible board, for use in structural steelwork protection systems with fire protection of up to 60 minutes, and can be installed before the building is weathertight.

PROMATECT®-XW is edge stapled, which is an extremely fast method of installation. This results in a more economical solution when compared to other systems or technologies. The board is moisture resistant, allowing installation up to 6 months before the building is weathertight*, and has a smooth, impact resistant surface.

The board can be left undecorated or easily finished with paints. The boards have a mineral composition without any volatile organic chemical used as additives during the manufacture.

PROMATECT®-XW is used to provide 3 and 4 sided encasement for I/H structural steel members, with coverage for limiting steel temperatures ranging from 300°C to 650°C.

Advantages

- A fully fire tested solution which has been independently assessed by Warrington Fire Testing and Certification, Certifire Certificate of Approval No. CF5942 to BS 476: Part 21: 1987, for fire protection of steel for up to 60 minutes.
- High compressive strength: Galvanised steel partition sections can be installed directly up to the face of the board and through fixed to the steel substrate wherever these partition sections abut a solid face of the encased steel profile.
- Tested at limiting temperatures from 300°C up to 650°C.
- Available in a single, 15mm thickness for ease of ordering and stocking.
- Quick, easy to cut and install saving time and reducing installed cost.
- Manufactured at our Etex manufacturing plant in Germany. The plant works to ISO 9001, ISO 14001 and ISO 45001 standards.

*PROMATECT®-XW is resistant to the effects of moisture and will not physically deteriorate when used in damp and humid conditions. It can be installed up to 6 months before the building is weathertight. The board should not be subject to water run-off from slabs or other parts of the building. The board should not be in contact with standing water. Where the board is located on the perimeter of the building and sits proud of the building line, exposed surfaces should be given additional weather protection using a breather membrane.

Design considerations

Maintaining Compartmentation

Where fire compartmentation is required as well as fire protection to the steel, fire insulation must be provided across the beam or column to the criteria of BS EN 1363-1 (maintaining fire insulation to average temperature rise of 140°C, maximum temperature 180°C). 15mm thick PROMATECT®-XW **on each side of the beam or column** will maintain compartmentation for up to 60 minutes.

Insulation within encasements: Low density (10-30kg/m³) glass mineral wool only, if required for acoustic or thermal performance.

Fire/smoke-tight seal: All boards abutting surrounding structure to be sealed using FSi PROMAT Pyrocoustic® Fire Resistant Sealant - Designed to seal any slight gaps at interfaces between the boards and the substrate, which have low movement requirements (±7.5%). Contains no solvents or halogen compounds.

Maximum board thickness: PROMATECT®-XW is manufactured in a single thickness of 15mm and can only be applied in single layer arrangements.

Different Profiles & Fixing Methods

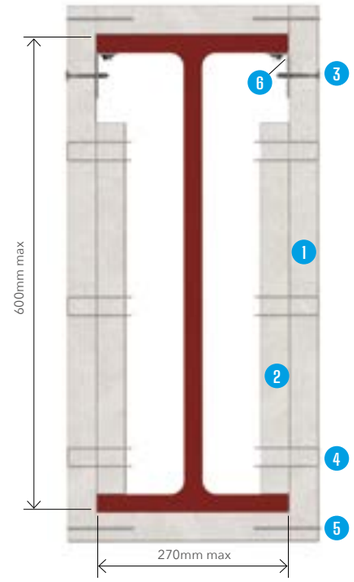
The following pages show Promat's standard PROMATECT®-XW solutions for the protection of I-section beams and H-section columns, with maximum permissible dimensions for each arrangement noted. The results for I/H-sections can be applied to hot-formed angles, channels and T-sections with the same section factor, using the same fixing method. Alternative structural steel profiles, such as square, rectangular and circular hollow sections can also be catered for, but may require different framing and fixing methods. For further details of these alternative steel profiles and fixing methods, please contact Promat's Technical Services Department.

PROMATECT®-XW is used to provide three or four sided encasements to:

- Universal columns and beams (I or H-sections) and joists
- Beams supporting composite floors with profiled metal decking
- Structural hollow sections
- Perimeter beams

PROMATECT®-XW BEAM ENCASEMENTS

4-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer Only

DETAIL 2.32

System Name

ST P2XW-007S: 4 Sided Beam Protection up to 600mm deep and 270mm wide. Angle fix. Single Layer only.

Fire Performance

Up to 60 minutes

Certification Reference

CF5942

Drawing Reference

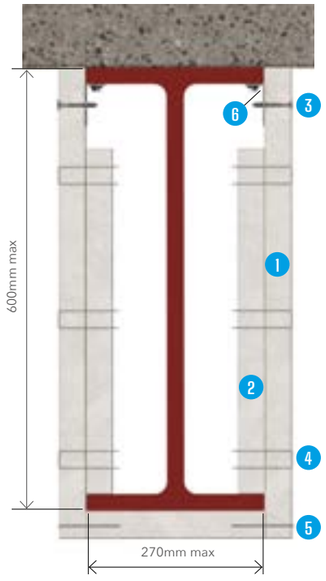
ST PXW-007

Instructions

Encasements are installed using metal angles fixed to the underside of the top steel flange.

1. PROMAT PROMATECT®-XW board, single 15mm thickness, determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board joints are coincident around the encasement.
2. PROMAT PROMATECT®-XW coverstrip, fitted behind all vertical board joints, minimum 120mm wide.
3. Fixings to metal angles: Minimum M3.5 x 32mm CSK Self-Tapping Screws at maximum 300mm centres.
4. Fixings to coverstrips: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.
5. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.
6. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling -self-tapping wafer head screws at maximum 300mm centres.

PROMATECT®-XW BEAM ENCASEMENTS
3-SIDED BEAM ENCASEMENT: ANGLE FIX



Single Layer Only

DETAIL 2.33

System Name
ST P2XW-005S: 3 Sided Beam Protection up to 600mm deep and 270mm wide. Angle fix. Single Layer only.

Fire Performance
Up to 60 minutes

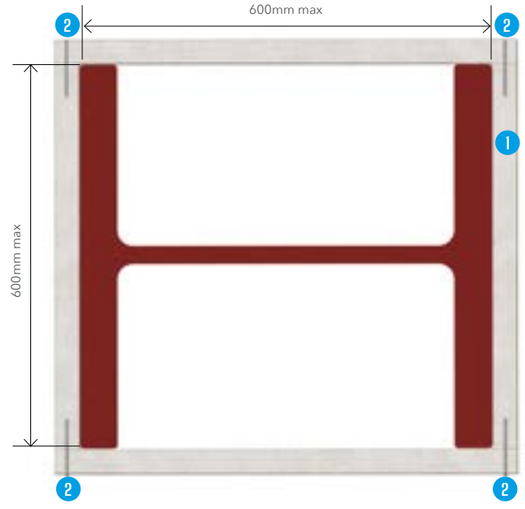
Certification Reference
CF5942

Drawing Reference
ST PXW-005

Instructions
Encasements are installed using metal angles fixed to the underside of the top steel flange

1. PROMAT PROMATECT®-XW board, single 15mm thickness, determined by section factor (A/V), fire resistance period and limiting steel temperature. Maximum board length 1200mm. Board joints are coincident around the encasement.
2. PROMAT PROMATECT®-XW coverstrip, fitted behind all vertical board joints, minimum 120mm wide.
3. Fixings to metal angles: Minimum M3.5 x 32mm CSK Self-Tapping Screws at maximum 300mm centres.
4. Fixings to coverstrips: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.
5. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.
6. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

PROMATECT®-XW COLUMN ENCASEMENTS
4-SIDED COLUMN ENCASEMENT: FRAMELESS FIX



Single Layer Only

DETAIL 2.34

System Name
ST PXW-008S: 4 Sided Column Protection up to 600mm x 600mm. Single Layer only.

Fire Performance
Up to 60 minutes

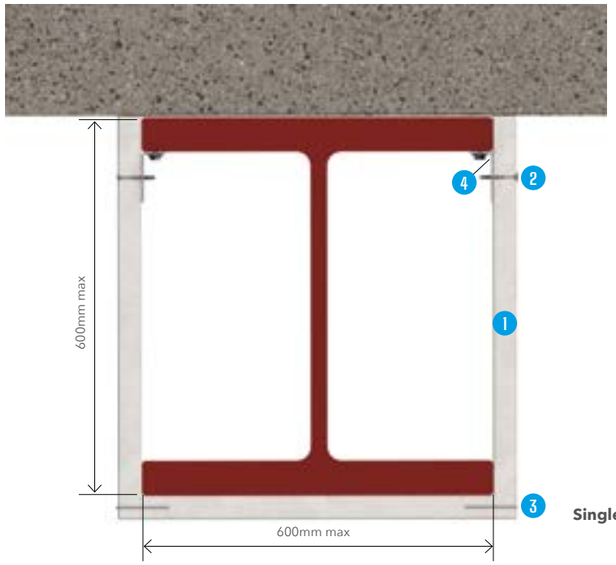
Certification Reference
CF5942

Drawing Reference
ST PXW-008

Instructions
Encasements are installed by edge fixing the boards around the column (Frameless).

1. PROMAT PROMATECT®-XW board, single 15mm thickness, determined by section factor (A/V), fire resistance period and limiting steel temperature. Board joints are staggered by 500mm minimum on adjacent faces.
2. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.

PROMATECT®-XW COLUMN ENCASEMENTS
3-SIDED COLUMN ENCASEMENT: ANGLE FIX



Single Layer Only

DETAIL 2.35

System Name
ST PXW-006S: 3 Sided Column Protection up to 600mm x 600mm, Angle fix. Single Layer only.

Fire Performance
Up to 60 minutes

Certification Reference
Promat recommendation based on CF5942

Drawing Reference
ST PXW-006

Instructions
Encasements are installed using metal angles fixed to the steel flanges.

1. PROMAT PROMATECT®-XW board, single 15mm thickness, determined by section factor (A/V), fire resistance period and limiting steel temperature. Board joints are staggered by 500mm minimum on adjacent faces.
2. Fixings to metal angles: Minimum M3.5 x 32mm CSK Self-Tapping Screws at maximum 300mm centres.
3. Fixings to Board Edge: Chisel Point Staples 35 x 12 x 1.6mm at maximum 100mm centres. The end staples are located nominally 40mm from the corner of the board.
4. Metal Angle minimum 50 x 25 x 0.7mm. Metal Angle Fixing: 3.7mm x 16mm Shot-fire nails or M4 x 10mm self-drilling self-tapping wafer head screws at maximum 300mm centres.

How to determine if using PROMATECT®-XW for structural steel is suitable.

The suitability of PROMATECT®-XW depends on the following factors:

- Period of fire resistance specified.
- The section factor of the steel (A/V) is based on the size of the steel and the number of sides exposed to the fire. The A/V ratios for steel sizes can be manually calculated or looked up in either the tables on pages 68 to 87 or refer to the ASFP Yellow Book which have most of the standard steel sizes.
- The limiting temperature for the steel as advised by the structural engineer or structural steel frame designer. If this is not available, it is often considered acceptable to use a value of 550°C for mild steel.
- Up to 60 minutes compartmentation is achieved with PROMATECT®-XW encasements

The following tables are then used to determine if the PROMATECT®-XW board can provide the required fire resistance period. PROMATECT®-XW is manufactured in a single, 15mm thickness and is installed in single layers only.

FIRE PROTECTION THICKNESS – PROMATECT®-XW

PROMATECT®-XW (15MM) - A/V RATIO FOR BEAM ENCASEMENTS

LIMITING STEEL TEMPERATURE	Fire resistance period (minutes)	
	30	60
300°C	365	90
350°C	365	105
400°C	365	135
450°C	365	160
500°C	365	200
550°C	365	245
600°C	365	310
650°C	365	365

PROMATECT®-XW (15MM) - A/V RATIO FOR COLUMN ENCASEMENTS

LIMITING STEEL TEMPERATURE	Fire resistance period (minutes)	
	30	60
300°C	220	60
350°C	290	70
400°C	365	85
450°C	365	105
500°C	365	120
550°C	365	140
600°C	365	155
650°C	365	180

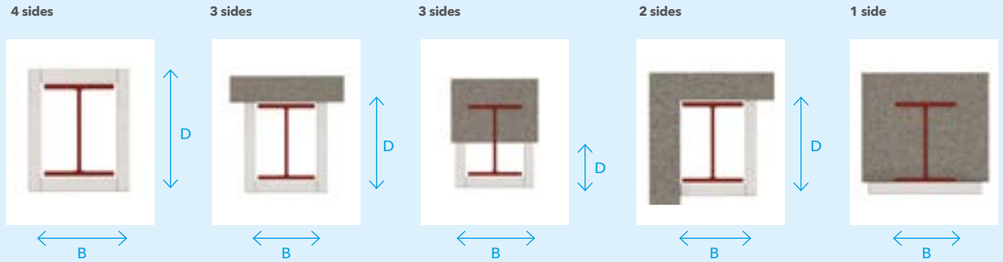
Calculation of Section Factors (A/V Values)

The degree of fire protection depends on the section factor for the steel section. The section factor of a hot rolled/formed or fabricated steel profile is defined as the surface area of the member per unit length (A_m) divided by the volume per unit length (V). It is measured in units of m^{-1}. It is perhaps simpler to consider it as the heated perimeter of the exposed cross section (H_P) divided by the total cross sectional area (A).

These two definitions give the same answer for uniform cross-sections and by convention, section factor is usually written A/V. The higher the A/V, the faster the steel section heats up, and so the greater the thickness of fire protection material required. The section factor and limiting temperature are then used to determine the thickness of protection required.

The following examples show how to calculate the H_P/A for a given steel profile, either fully or partially exposed.

HEATED PERIMETER (H_P) FOR UNIVERSAL BEAMS, UNIVERSAL COLUMNS, RSJ'S AND OTHER SECTIONS



2B + 2D	B + 2D	B + 2D	B + D	B

Example 1:	Steel beam, serial size 406mm x 178mm x 54kg/m to be encased on three sides
Serial size	406mm x 178mm
Actual size	402.6mm x 177.6mm
H_P	B+2D
	177.6 + 402.6 + 402.6
	982.8mm (0.9828m)
A	68.4cm^2 (0.00684m^2)
H_P/A	0.9828 / 0.00684
	143.7
	144m^{-1}
The value of A, the cross-sectional area, can be obtained either from steelwork tables or by accurate measurement.	

Example 2:	Steel beam, serial size 406mm x 178mm x 54kg/m to be encased on two sides
Serial size	406mm x 178mm
Actual size	402.6mm x 177.6mm
H_P	B+D
	177.6 + 402.6
	580.2mm (0.5802m)
A	68.4cm^2 (0.00684m^2)
H_P/A	0.5802 / 0.00684
	84.8
	85m^{-1}

Limiting Temperatures

The limiting steel temperature is typically the maximum temperature that a steel member can withstand before it experiences significant degradation in strength and structural integrity.

Historically, this has been 550°C for columns and 620°C for beams supporting a concrete deck. A more detailed understanding of performance of structural steel has shown that this may have been a simplistic representation of the behaviour of structural steel at these temperatures.

To aid structural engineers, we therefore now include tables to demonstrate performance of structural steel encasements to a series of limiting steel temperatures.

In cases where the actual limiting temperature required for the steel section does not match limiting temperature figures quoted in product tables, the limiting temperature should be rounded down to the closest set of tabulated data that's **BELOW** that required for the structural design.

Box Protection

When calculating the A/V value, A is the exposed heated perimeter and that depends on the configuration of the fire protection. In the case of a 'box' protection, the heated perimeter is taken as the sum of the inside dimensions of the smallest possible rectangular or square encasement, whilst for a 'profile' protection, it is taken as the external heated perimeter of the steel section itself. Where a section supports a floor or is against a wall which themselves provide fire protection, the surface in contact is ignored in calculating A.

Encasements following the profile of the steel section will generally have a higher A/V section factor than a box encasement.

Please contact Promat Technical Services Department for further advice if required. The serial size and mass per metre of most steel sections are available in tables from steel manufacturers, which also give A/V values calculated for 3 or 4-sided box protection.

Further guidance can be found in the ASFP publication 'Fire Protection for Structural Steel in Buildings' (The Yellow Book).

Cellular and Castellated Beams - Section Factor

The introduction of openings in the web of the steel beam means the structural capability of the beam differs from that of a solid beam in that the failure mode in fire is related to the closeness of holes and the web slenderness in addition to section factor. Structural failure can be through Vierendeel bending above the opening or buckling of the web post. These failure modes generally occur at lower temperatures than a plain beam of the same size. It is therefore important that the steel web temperature needs to be controlled.

Cellular beams are usually designed for specific applications and as such will have a limiting temperature calculated from a structural model by a specialist manufacturer or competent structural engineer. Where this has not been provided then a limiting temperature of 450°C may be used following the guidance in the ASFP Yellow Book 5th edition 2014.

The method of calculating the section factor for cellular beams with apertures is treated in a different manner than in the case of solid and hollow steel sections.

The section factor for that beam shall be determined as the highest value derived from the following:

a) The section factor of the 'T' section above the opening.

b) The section factor of the 'T' section below the opening.

c) The section factor derived from $1400/t_W$ where t_W is the thickness of the web in mm.

In all cases the thickness of protection obtained based on the section factor and temperature as derived above shall be increased by 20%. The applied thickness shall not exceed the maximum assessed for the product for beam protection.

Promat Technical Services Department can calculate A/V section factors and required board thicknesses on request.

A/V TABLES

A/V section factor: section factor for standard steel sections are shown.
Please consult a qualified structural engineer for detailed advice if steel sizes fall outside those shown.

UK BEAMS (UKB)

TABLE 2.6. UK BEAMS (UKB)

Dimensions to BS EN 10365:2017							Section Factor A/V (Hp/A)			
							Profile		Box	
							3 Sides	4 Sides	3 Sides	4 Sides
Designation		Depth of	Width of	Thickness of	Thickness of	Area of				
Serial Size	Mass	Section, D	Section, B	Web, t	Flange, T	Section, A				
mm	kg/m	mm	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹
1016 x 305	487	1036.1	308.5	30.0	54.1	619.89	45	50	40	45
	438	1025.9	305.4	26.9	49.0	556.62	50	55	40	50
	393	1016.0	303.0	24.4	43.9	500.24	55	65	45	55
	349	1008.1	302.0	21.1	40.0	445.15	65	70	50	60
	314	1000.0	300.0	19.1	35.9	400.41	70	80	55	65
	272	990.1	300.0	16.5	31.0	346.86	80	90	65	75
	249	980.2	300.0	16.5	26.0	316.88	90	95	70	80
	222	970.3	300.0	16.0	21.1	282.82	95	110	80	90
914 x 419	388	921.0	420.5	21.4	36.6	494.22	60	70	45	55
	343	911.8	418.5	19.4	32.0	437.30	70	80	50	60
914 x 305	289	926.6	307.7	19.5	32.0	368.27	75	80	60	65
	253	918.4	305.5	17.3	27.9	322.83	85	95	65	75
	224	910.4	304.1	15.9	23.9	285.64	95	105	75	85
	201	903.0	303.3	15.1	20.2	255.92	105	115	80	95
838 x 292	226	850.9	293.8	16.1	26.8	288.56	85	100	70	80
	194	840.7	292.4	14.7	21.7	246.82	100	115	80	90
	176	834.9	291.7	14.0	18.8	224.02	110	125	90	100
762 x 267	197	769.8	268.0	15.6	25.4	250.64	90	100	70	85
	173	762.2	266.7	14.3	21.6	220.37	105	115	80	95
	147	754.0	265.2	12.8	17.5	187.19	120	135	95	110
	134	750.0	264.4	12.0	15.5	170.58	130	145	105	120
686 x 254	170	692.9	255.8	14.5	23.7	216.83	95	110	75	90
	152	687.5	254.5	13.2	21.0	194.08	105	120	85	95
	140	683.5	253.7	12.4	19.0	178.43	115	130	90	105
	125	677.9	253.0	11.7	16.2	159.48	130	145	100	115
610 x 305	238	635.8	311.4	18.4	31.4	303.33	70	80	50	60
	179	620.2	307.1	14.1	23.6	228.08	90	105	70	80
	149	612.4	304.8	11.8	19.7	190.04	110	125	80	95
610 x 229	140	617.2	230.2	13.1	22.1	178.19	105	120	80	95
	125	612.2	229.0	11.9	19.6	159.34	115	130	90	105
	113	607.6	228.2	11.1	17.3	143.94	130	145	100	115
	101	602.6	227.6	10.5	14.8	128.92	145	160	110	130
610 x 178	100	607.4	179.2	11.3	17.2	128.00	135	150	110	125
	92	603.0	178.8	10.9	15.0	117.00	145	160	120	135
	82	598.6	177.9	10.0	12.8	104.00	160	180	130	150
533 x 312	273	577.1	320.2	21.1	37.6	348.00	60	70	40	50
	219	560.3	317.4	18.3	29.2	279.00	70	85	50	65
	182	550.7	314.5	15.2	24.4	231.00	85	100	60	75
	151	542.5	312.0	12.7	20.3	192.00	105	120	75	90
533 x 210	138	549.1	213.9	14.7	23.6	176.00	95	110	75	85
	122	544.5	211.9	12.7	21.3	155.39	110	120	85	95
	109	539.5	210.8	11.6	18.8	138.86	120	135	95	110
	101	536.7	210.0	10.8	17.4	128.67	130	145	100	115
	92	533.1	209.3	10.1	15.6	117.38	140	160	110	125
	82	528.3	208.8	9.6	13.2	104.69	155	175	120	140

UK BEAMS (UKB)

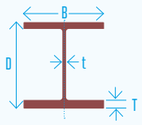
TABLE 2.7. UK BEAMS (UKB)

Dimensions to BS EN 10365:2017							Section Factor A/V (Hp/A)			
							Profile		Box	
							3 Sides	4 Sides	3 Sides	4 Sides
Designation		Depth of	Width of	Thickness of	Thickness of	Area of				
Serial Size	Mass	Section, D	Section, B	Web, t	Flange, T	Section, A				
mm	kg/m	mm	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹
533 x 165	85	534.9	166.5	10.3	16.5	108.00	140	155	115	130
	75	529.1	165.9	9.7	13.6	95.20	160	175	130	145
	66	524.7	165.1	8.9	11.4	83.70	180	200	145	165
457 x 191	161	492.0	199.4	18.0	32.0	206.00	75	85	60	65
	133	480.6	196.7	15.3	26.3	170.00	90	100	70	80
	106	469.2	194.0	12.6	20.6	135.00	110	125	85	100
	98	467.2	192.8	11.4	19.6	125.26	120	135	90	105
	89	463.4	191.9	10.5	17.7	113.76	130	145	100	115
	82	460.0	191.3	9.9	16.0	104.48	140	160	105	125
	74	457.0	190.4	9.0	14.5	94.63	155	175	115	135
	67	453.4	189.9	8.5	12.7	85.51	170	190	130	150
457 x 152	82	465.8	155.3	10.5	18.9	104.53	130	145	105	120
	74	462.0	154.4	9.6	17.0	94.48	145	160	115	130
	67	458.0	153.8	9.0	15.0	85.55	155	175	125	145
	60	454.6	152.9	8.1	13.3	76.23	175	195	140	160
	52	449.8	152.4	7.6	10.9	66.64	200	220	160	180
406 x 178	85	417.2	181.9	10.9	18.2	109.00	125	140	95	110
	74	412.8	179.5	9.5	16.0	94.51	140	160	105	125
	67	409.4	178.8	8.8	14.3	85.54	155	175	115	140
	60	406.4	177.9	7.9	12.8	76.52	170	195	130	155
	54	402.6	177.7	7.7	10.9	68.95	190	215	145	170
406 x 140	53	406.6	143.3	7.9	12.9	67.90	180	200	140	160
	46	403.2	142.2	6.8	11.2	58.64	205	230	160	185
	39	398.0	141.8	6.4	8.6	49.65	240	270	190	215
356 x 171	67	363.4	178.1	9.1	15.7	85.49	140	160	105	125
	57	358.0	172.2	8.1	13.0	72.55	165	190	120	145
	51	355.0	171.5	7.4	11.5	64.91	185	210	135	160
	45	351.4	171.1	7.0	9.7	57.33	205	235	150	180
356 x 127	39	353.4	126.0	6.6	10.7	49.77	210	235	165	195
	33	349.0	125.4	6.0	8.5	42.13	250	280	195	225
305 x 165	54	310.4	166.9	7.9	13.7	68.77	160	185	115	140
	46	306.6	165.7	6.7	11.8	58.75	185	210	135	160
	40	303.4	165.0	6.0	10.2	51.32	210	240	150	185
305 x 127	48	311.0	125.3	9.0	14.0	61.23	160	180	120	145
	42	307.2	124.3	8.0	12.1	53.40	180	200	140	160
	37	304.4	123.4	7.1	10.7	47.18	200	225	155	180
305 x 102	33	312.7	102.4	6.6	10.8	41.83	215	240	175	200
	28	308.7	101.8	6.0	8.8	35.88	250	280	200	230
	25	305.1	101.6	5.8	7.0	31.60	280	315	225	255
254 x 146	43	259.6	147.3	7.2	12.7	54.77	170	195	120	150
	37	256.0	146.4	6.3	10.9	47.16	195	225	140	170
	31	251.4	146.1	6.0	8.6	39.68	230	270	165	200
254 x 102	28	260.4	102.2	6.3	10.0	36.08	220	250	175	200
	25	257.2	101.9	6.0	8.4	32.04	250	280	190	225
	22	254.0	101.6	5.7	6.8	28.02	280	320	220	255

UK BEAMS (UKB)

TABLE 2.8. UK BEAMS (UKB)

Dimensions to BS EN 10365:2017



Section Factor A/V (Hp/A)

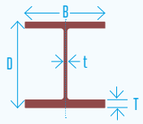
	Profile		Box	
	3 Sides	4 Sides	3 Sides	4 Sides
				

Designation		Depth of	Width of	Thickness of	Thickness of	Area of				
Serial Size	Mass	Section, D	Section, B	Web, t	Flange, T	Section, A				
mm	kg/m	mm	mm	mm	mm	cm²	m-1	m-1	m-1	m-1
203 x 133	30	206.8	133.9	6.4	9.6	38.21	205	240	145	180
	25	203.2	133.2	5.7	7.8	31.97	245	285	170	210
203 x 102	23	203.2	101.8	5.4	9.3	29.40	235	270	175	205
178 x 102	19	177.8	101.2	4.8	7.9	24.26	260	305	190	230
152 x 89	16	152.4	88.7	4.5	7.7	20.32	270	315	195	235
127 x 76	13	127.0	76.0	4.0	7.6	16.52	280	325	200	245

UK COLUMNS (UKC)

TABLE 2.9. UK COLUMNS (UKC)

Dimensions to BS EN 10365:2017



Section Factor A/V (Hp/A)

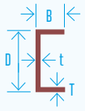
	Profile		Box	
	3 Sides	4 Sides	3 Sides	4 Sides
				

Designation		Depth of	Width of	Thickness of	Thickness of	Area of				
Serial Size	Mass	Section, D	Section, B	Web, t	Flange, T	Section, A				
mm	kg/m	mm	mm	mm	mm	cm²	m-1	m-1	m-1	m-1
356 x 406	634	474.6	424.0	47.6	77.0	807.55	25	30	15	20
	551	455.6	418.5	42.1	67.5	701.93	30	35	20	25
	467	436.6	412.2	35.8	58.0	594.91	35	40	20	30
	393	419.0	407.0	30.6	49.2	500.57	40	50	25	35
	340	406.4	403.0	26.6	42.9	433.04	45	55	30	35
	287	393.6	399.0	22.6	36.5	365.71	50	65	30	45
	235	381.0	394.8	18.4	30.2	299.43	65	75	40	50
356 x 368	202	374.6	374.7	16.5	27.0	257.22	70	85	45	60
	177	368.2	372.6	14.4	23.8	225.52	80	95	50	65
	153	362.0	370.5	12.3	20.7	194.80	90	110	55	75
	129	355.6	368.6	10.4	17.5	164.31	110	130	65	90
305 x 305	283	365.3	322.2	26.8	44.1	360.41	45	55	30	40
	240	352.5	318.4	23.0	37.7	305.79	50	60	35	45
	198	339.9	314.5	19.1	31.4	252.41	60	75	40	50
	158	327.1	311.2	15.8	25.0	201.36	75	90	50	65
	137	320.5	309.2	13.8	21.7	174.41	85	105	55	70
	118	314.5	307.4	12.0	18.7	150.20	100	120	60	85
	97	307.9	305.3	9.9	15.4	123.45	120	145	75	100
254 x 254	167	289.1	265.2	19.2	31.7	212.85	60	75	40	50
	132	276.3	261.3	15.3	25.3	168.13	75	90	50	65
	107	266.7	258.8	12.8	20.5	136.38	95	110	60	75
	89	260.3	256.3	10.3	17.3	113.31	110	135	70	90
	73	254.1	254.6	8.6	14.2	93.10	130	160	80	110
203 x 203	127	241.4	213.9	18.1	30.1	162.00	65	80	45	55
	113	235.0	212.1	16.3	26.9	145.00	75	90	45	60
	100	228.6	210.3	14.5	23.7	127.00	80	100	55	70
	86	222.2	209.1	12.7	20.5	109.64	95	115	60	80
	71	215.8	206.4	10.0	17.3	90.43	110	135	70	95
	60	209.6	205.8	9.4	14.2	76.37	130	160	80	110
	52	206.2	204.3	7.9	12.5	66.28	150	180	95	125
	46	203.2	203.6	7.2	11.0	58.73	170	200	105	140
152 x 152	51	170.2	157.4	11.0	15.7	65.20	120	145	75	100
	44	166.0	155.9	9.5	13.6	56.10	135	165	85	115
	37	161.8	154.4	8.0	11.5	47.11	160	195	100	135
	30	157.6	152.9	6.5	9.4	38.26	195	235	120	160
	23	152.4	152.2	5.8	6.8	29.24	250	305	155	210

PARALLEL FLANGE CHANNELS (PFC)

TABLE 2.10. PARALLEL FLANGE CHANNELS (PFC)

Dimensions to BS EN 10365:2017



Section Factor A/V (Hp/A)

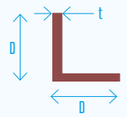
Profile				Box			
3 Sides	3 Sides	3 Sides	4 Sides	3 Sides	3 Sides	3 Sides	4 Sides

Designation		Depth of	Width of	Thickness of	Thickness of	Area of								
Serial Size	Mass	Section, D	Section, B	Web, t	Flange, T	Section, A								
mm	kg/m	mm	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
430 x 100	64.40	430	100	11.0	19.0	82.09	135	95	75	150	115	75	75	130
380 x 100	54.00	380	100	9.5	17.5	68.74	150	110	85	165	125	85	85	140
300 x 100	45.50	300	100	9.0	16.5	58.00	150	115	85	165	120	85	85	140
300 x 90	41.40	300	90	9.0	15.5	52.78	160	120	90	175	130	90	90	150
260 x 90	34.80	260	90	8.0	14.0	44.38	170	135	100	190	135	100	100	160
260 x 75	27.60	260	75	7.0	12.0	35.14	205	150	115	225	170	115	115	190
230 x 90	32.20	230	90	7.5	14.0	40.97	170	140	100	195	135	100	100	155
230 x 75	25.70	230	75	6.5	12.5	32.69	200	155	115	225	165	115	115	185
200 x90	29.70	200	90	7.0	14.0	37.86	170	140	100	195	130	100	100	155
200 x 75	23.40	200	75	6.0	12.5	29.87	200	160	115	225	160	115	115	185
180 x90	26.10	180	90	6.5	12.5	33.19	185	155	110	210	135	110	110	165
180 x 75	20.30	180	75	6.0	10.5	25.91	215	175	125	245	170	125	125	195
150 x 90	23.90	150	90	6.5	12.0	30.41	180	160	110	210	130	110	110	160
150 x 75	17.90	150	75	5.5	10.0	22.77	220	190	130	255	165	130	130	200
125 x 65	14.80	125	65	5.5	9.5	18.80	225	195	135	260	170	135	135	200
100 x 50	10.20	100	50	5.0	8.5	13.00	255	215	155	295	190	155	155	230

EQUAL ANGLES (UKA)

TABLE 2.11. EQUAL ANGLES (UKA)

Dimensions to BS EN 10056-1: 2017



Section Factor A/V (Hp/A)

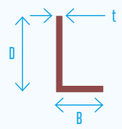
Profile			Box	
3 Sides	3 Sides	4 Sides	3 Sides	4 Sides

Designation			Area of					
Serial Size D x D	Thickness, t	Mass	Section, A					
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
200 x 200	24	71.1	90.6	65	85	85	65	90
	20	59.9	76.3	75	100	105	80	105
	18	54.2	69.1	85	110	115	85	115
	16	48.5	61.8	95	125	125	95	130
150 x 150	18	40.1	51.0	85	110	115	90	120
	15	33.8	43.0	100	135	135	105	140
	12	27.3	34.8	125	165	170	130	170
	10	23.0	29.3	150	195	200	155	205
120 x 120	15	26.6	33.9	105	135	140	105	140
	12	21.6	27.5	125	165	170	130	175
	10	18.2	23.2	150	200	200	155	205
	8	14.7	18.7	185	245	250	190	255
100 x 100	15	21.9	27.9	105	135	140	110	145
	12	17.8	22.7	130	165	170	130	175
	10	15.0	19.2	150	200	205	155	210
	8	12.2	15.5	185	245	250	195	260
90 x 90	12	15.9	20.3	130	165	175	135	175
	10	13.4	17.1	150	200	205	160	210
	8	10.9	13.9	190	245	250	195	260
	7	9.6	12.2	215	280	285	220	295

UNEQUAL ANGLES (UKA)

TABLE 2.12. UNEQUAL ANGLES (UKA)

Dimensions to BS EN 10056-1:1999



Section Factor A/V (Hp/A)

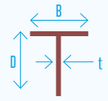
	Profile					Box				
	3 Sides	3 Sides	3 Sides	3 Sides	4 Sides	3 Sides	3 Sides	3 Sides	3 Sides	4 Sides
										

Designation			Area of										
Serial Size D x B	Thickness, t	Mass	Section, A										
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
200 x 150	18	47.1	60.0	115	115	90	80	115	90	85	90	85	115
	15	39.6	50.5	135	135	105	95	135	110	100	110	100	140
	12	32.0	40.8	165	165	130	120	170	135	125	135	125	170
200x 100	15	33.7	43.0	135	135	115	90	135	115	95	115	95	140
	12	27.3	34.8	165	165	140	110	170	145	115	145	115	170
	10	23.0	29.2	200	200	165	130	200	170	135	170	135	205
150 x 90	15	26.6	33.9	135	135	110	95	140	115	95	115	95	140
	12	21.6	27.5	170	170	140	115	170	140	120	140	120	175
	10	18.2	23.2	200	200	165	140	205	170	145	170	145	205
150 x 75	15	24.8	31 .7	135	135	115	90	140	120	95	120	95	140
	12	20.2	25.7	170	170	140	115	170	145	115	145	115	175
	10	17.0	21.7	200	200	170	135	205	175	140	175	140	210
125 x 75	12	17.8	22.7	170	170	140	115	170	145	120	145	120	175
	10	15.0	19.1	200	200	165	140	205	170	145	170	145	210
	8	12.2	15.5	250	250	205	170	250	210	180	210	180	260
100 x 75	12	15.4	19.7	170	170	135	125	175	140	125	140	125	180
	10	13.0	16.6	205	205	160	145	205	165	150	165	150	210
	8	10.6	13.5	250	250	200	180	255	205	185	205	185	260
100 x 65	10	12.3	15.6	205	205	165	140	205	170	145	170	145	210
	8	9.9	12.7	250	250	200	175	255	210	180	210	180	260
	7	8.8	11.2	285	285	230	200	290	235	205	235	205	295

STRUCTURAL TEES – SPLIT FROM UK BEAMS (UKT)

TABLE 2.13. STRUCTURAL TEES – SPLIT FROM UK BEAMS (UKT)

Dimensions to BS EN 10365: 2017



Section Factor A/V (Hp/A)

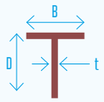
	Profile			Box		
	3 Sides	3 Sides	4 Sides	3 Sides	3 Sides	4 Sides
						

Designation		Width of	Depth of	Web	Area of						
Serial Size	Mass	Section, B	Section, D	Thickness, t	Section, A						
mm	kg/m	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
254 x 343	62.6	253.0	338.9	11.7	79.73	115	145	145	115	115	150
305 x 305	119.0	311.4	317.9	18.4	152	60	80	80	60	60	85
	89.5	307.1	310.0	14.1	114.03	80	105	105	80	80	110
	74.6	304.8	306.1	11.8	95.01	95	125	125	95	95	130
229 x 305	69.9	230.2	308.5	13.1	89.08	95	120	120	95	95	120
	62.5	229.0	306.0	11.9	79.66	105	130	135	105	105	135
	56.5	228.2	303.7	11.1	71.96	115	145	145	115	115	150
	50.6	227.6	301.2	10.5	64.45	125	160	160	130	130	165
178 x 305	50.1	179.2	303.7	11.3	63.90	120	150	150	125	125	150
	46.1	178.8	301.5	10.9	58.70	130	160	160	135	135	165
	40.9	177.9	299.3	10.0	52.10	145	180	180	150	150	185
312 x 267	136.7	320.2	288.8	21.1	174	50	70	70	50	50	70
	109.4	317.4	280.4	18.3	139	60	85	85	65	65	85
	90.7	314.5	275.6	15.2	116	75	100	100	75	75	100
	75.3	312.0	271.5	12.7	95.90	90	120	120	90	90	120
210 x 267	69.1	213.9	274.5	14.7	23.60	85	110	110	85	85	110
	61.0	211.9	272.2	12.7	77.69	95	125	125	95	95	125
	54.5	210.8	269.7	11.6	69.43	105	135	135	110	110	140
	50.5	210.0	268.3	10.8	64.33	115	145	145	115	115	150
	46.0	209.3	266.5	10.1	58.68	125	160	160	125	125	160
	41.1	208.8	264.1	9.6	52.34	140	175	180	140	140	180
165 x 267	42.3	166.5	267.1	10.3	54.0	130	155	160	130	130	160
	37.4	165.9	264.5	9.7	47.6	145	175	180	145	145	180
	32.8	165.1	262.4	8.9	41.9	160	200	200	165	165	205
191 x 229	80.7	199.4	246.0	18.0	103	65	85	85	65	65	85
	66.6	196.7	240.3	15.3	84.9	80	100	100	80	80	105
	52.9	194.0	234.6	12.6	67.4	95	125	125	100	100	125
	49.1	192.8	233.5	11.4	62.62	105	135	135	105	105	135
	44.6	191.9	231.6	10.5	58.87	115	145	145	115	115	150
	41.0	191.3	229.9	9.9	52.23	125	160	160	125	125	160
	37.1	190.4	228.4	9.0	47.31	135	175	175	135	135	175
	33.5	189.9	226.6	8.5	42.75	150	190	195	150	150	195
152 x 229	41.0	155.3	232.8	10.5	52.26	115	145	145	120	120	150
	37.1	154.4	230.9	9.6	47.23	130	160	160	130	130	165
	33.6	153.8	228.9	9.0	42.77	140	175	175	145	145	180
	29.9	152.9	227.2	8.1	38.11	155	195	195	160	160	200
	26.1	152.4	224.8	7.6	33.31	180	220	225	180	180	225
178 x 203	42.6	181.9	208.6	10.9	54.30	110	140	140	110	110	145
	37.1	179.5	206.3	9.5	47.24	125	160	160	125	125	165
	33.5	178.8	204.6	8.8	42.76	135	175	175	140	140	180
	30.0	177.9	203.1	7.9	38.25	150	195	195	155	155	200
	27.0	177.7	201.2	7.7	34.47	165	215	215	170	170	220
140 x 203	26.6	143.3	203.3	7.9	34.0	160	200	200	160	160	205
	23.0	142.2	201.5	6.8	29.31	185	230	230	185	185	235
	19.5	141.8	198.9	6.4	24.82	215	270	270	215	215	275

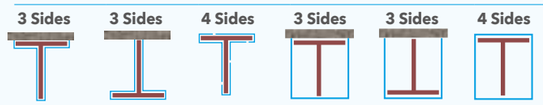
STRUCTURAL TEES – SPLIT FROM UK BEAMS (UKT)

TABLE 2.14. STRUCTURAL TEES – SPLIT FROM UK BEAMS (UKT)

Dimensions to BS EN 10365: 2017



Section Factor A/V (Hp/A)

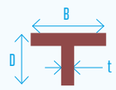


						Profile			Box		
						3 Sides	3 Sides	4 Sides	3 Sides	3 Sides	4 Sides
Designation		Width of	Depth of	Web	Area of						
Serial Size	Mass	Section, B	Section, D	Thickness, t	Section, A						
mm	kg/m	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
171 x 178	33.5	173.2	181.6	9.1	42.74	125	160	165	125	125	165
	28.5	172.2	178.9	8.1	36.27	145	190	190	145	145	195
	25.5	171.5	177.4	7.4	32.44	160	210	210	160	160	215
	22.5	171.1	175.6	7.0	28.66	180	235	240	180	180	240
127 x 178	19.5	126.0	176.6	6.6	24.88	190	235	240	195	195	245
	16.5	125.4	174.4	6.0	21.06	220	280	280	225	225	285
165 x 152	27.0	166.9	155.1	7.9	34.38	135	185	185	140	140	185
	23.0	165.7	153.2	6.7	29.37	160	210	215	160	160	215
	20.1	165.0	151.6	6.0	25.65	180	240	245	185	185	245
127 x 152	24.0	125.3	155.4	9.0	30.61	140	180	180	140	140	185
	20.9	124.3	153.5	8.0	26.69	160	200	205	160	160	210
	18.5	123.4	152.1	7.1	23.58	180	225	230	180	180	235
102 x 152	16.4	102.4	156.3	6.6	20.91	195	240	245	200	200	245
	14.1	101.8	154.3	6.0	17.93	225	280	280	230	230	285
	12.4	101.6	152.5	5.8	15.80	255	315	320	255	255	320
146 x 127	21.5	147.3	129.7	7.2	27.38	145	195	200	150	150	200
	18.5	146.4	127.9	6.3	23.58	170	225	230	170	170	235
	15.5	146.1	125.6	6.0	19.83	195	270	270	200	200	275
102 x 127	14.1	102.2	130.1	6.3	18.03	195	250	255	200	200	260
	12.6	101.9	128.5	6.0	16.01	220	280	285	225	225	290
	11.0	101.6	126.9	5.7	14.00	250	320	320	255	255	325
133 x 102	15.0	133.9	103.3	6.4	19.10	175	240	245	180	180	250
	12.5	133.2	101.5	5.7	15.98	205	285	290	210	210	295

STRUCTURAL TESS – SPLIT FROM UK COLUMNS (UKT)

TABLE 2.15. STRUCTURAL TEES – SPLIT FROM UK COLUMNS (UKT)

Dimensions to BS EN 10365: 2017



Section Factor A/V (Hp/A)

						Profile			Box		
						3 Sides	3 Sides	4 Sides	3 Sides	3 Sides	4 Sides
Designation		Width of	Depth of	Web	Area of						
Serial Size	Mass	Section, B	Section, D	Thickness, t	Section, A						
mm	kg/m	mm	mm	mm	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
305 x 152	79.0	311.2	163.5	15.8	100.67	60	90	95	65	65	95
	68.4	309.2	160.2	13.8	87.20	70	105	105	70	70	110
	58.9	307.4	157.2	12.0	75.10	80	120	120	85	85	125
	48.4	305.3	153.9	9.9	61.72	95	145	145	100	100	150
254 x 127	83.5	265.2	144.5	19.2	106	50	75	75	50	50	75
	66.0	261.3	138.1	15.3	84.06	65	90	95	65	65	95
	53.5	258.8	133.3	12.8	68.18	75	110	115	75	75	115
	44.4	256.3	130.1	10.3	56.65	90	135	135	90	90	135
	36.5	254.6	127.0	8.6	46.55	105	160	160	110	110	165
203 x 102	63.7	213.9	120.7	18.1	81.2	55	80	80	55	55	80
	56.7	212.1	117.5	16.3	72.3	60	90	90	60	60	90
	49.8	210.3	114.3	14.5	63.4	70	100	100	70	70	100
	43.0	209.1	111.0	12.7	54.81	75	115	115	80	80	115
	35.5	206.4	107.8	10.0	45.20	90	135	135	95	95	140
	30.0	205.8	104.7	9.4	38.18	105	160	160	110	110	165
	26.0	204.3	103.0	7.9	33.13	120	180	185	125	125	185
	23.0	203.6	101.5	7.2	29.36	135	200	205	140	140	210
152 x 76	25.6	157.4	85.1	11.0	32.6	100	145	145	100	100	150
	22.0	155.9	83.0	9.5	28.0	110	165	170	115	115	170
	18.5	154.4	80.8	8.0	23.55	130	195	195	135	135	200
	15.0	152.9	78.7	6.5	19.12	160	235	240	160	160	240
	11.5	152.2	76.1	5.8	14.62	205	305	310	210	210	310

ROLLED TEES: WHILST THE ASFP PUBLICATION HAS PREVIOUSLY INCLUDED LISTINGS FOR FOUR SIZES OF 'ROLLED TEES' WE ARE INFORMED BY CORUS CONSTRUCTION AND INDUSTRIAL DIVISION THAT 'ROLLED TEES' ARE NO LONGER AVAILABLE FROM THEIR CURRENT MANUFACTURING FACILITIES.

CIRCULAR HOLLOW SECTIONS (CHS)

TABLE 2.16. CIRCULAR HOLLOW SECTIONS (CHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)	
				Profile	Box
Outside Dia	Wall Thickness, t	Mass	Area of Section, A		
mm	mm	kg/m	cm²	m⁻¹	m⁻¹
21.3	2.6	1.20	1.53	440	440
	2.9	1.32	1.68	400	400
	3.2	1.43	1.82	370	370
26.9	2.6	1.56	1.98	425	425
	2.9	1.72	2.19	385	385
	3.2	1.87	2.38	355	355
33.7	2.6	1.99	2.54	415	415
	2.9	2.20	2.81	375	375
	3.2	2.41	3.07	345	345
	3.6	2.67	3.40	310	310
	4.0	2.93	3.73	285	285
42.4	2.6	2.55	3.25	410	410
	2.9	2.82	3.60	370	370
	3.2	3.09	3.94	340	340
	3.6	3.44	4.39	305	305
	4.0	3.79	4.83	275	275
	5.0	4.61	5.87	230	230
48.3	2.9	3.25	4.14	365	365
	3.2	3.56	4.53	335	335
	3.6	3.97	5.06	300	300
	4.0	4.37	5.57	270	270
	5.0	5.34	6.80	225	225
60.3	2.9	4.11	5.23	360	360
	3.2	4.51	5.74	330	330
	3.6	5.03	6.41	295	295
	4.0	5.55	7.07	270	270
	5.0	6.82	8.69	220	220
76.1	2.9	5.24	6.67	360	360
	3.2	5.75	7.33	325	325
	3.6	6.44	8.20	290	290
	4.0	7.11	9.06	265	265
	5.0	8.77	11.2	215	215
	6.3	10.8	13.8	175	175
88.9	2.9	6.15	7.84	355	355
	3.2	6.76	8.62	325	325
	3.6	7.57	9.65	290	290
	4.0	8.38	10.7	260	260
	5.0	10.3	13.2	210	210
	6.3	12.8	16.3	170	170
114.3	3.2	8.77	11.2	320	320
	3.6	9.83	12.5	285	285
	4.0	10.9	13.9	260	260
	5.0	13.5	17.2	210	210
	6.3	16.8	21.4	170	170

TABLE 2.17. CIRCULAR HOLLOW SECTIONS (CHS)

Dimensions to EN 10210 S355J2H				Section Factor A/V (Hp/A)	
				Profile	Box
Outside Dia	Wall Thickness, t	Mass	Area of Section, A		
mm	mm	kg/m	cm²	m⁻¹	m⁻¹
139.7	3.2	10.8	13.7	320	320
	3.6	12.1	15.4	285	285
	4.0	13.4	17.1	255	255
	5.0	16.6	21.2	205	205
	6.3	20.7	26.4	165	165
	8.0	26.0	33.1	135	135
	10.0	32.0	40.7	110	110
168.3	5.0	20.1	25.7	205	205
	6.3	25.2	32.1	165	165
	8.0	31.6	40.3	130	130
	10.0	39.0	49.7	105	105
	12.5	48.0	61.2	85	85
193.7	5.0	23.3	29.6	205	205
	6.3	29.1	37.1	165	165
	8.0	36.6	46.7	130	130
	10.0	45.3	57.7	105	105
	12.5	55.9	71.2	85	85
219.1	5.0	26.4	33.6	205	205
	6.3	33.1	42.1	165	165
	8.0	41.6	53.1	130	130
	10.0	51.6	65.7	105	105
	12.5	63.7	81.1	85	85
	14.2	71.8	91.4	75	75
	16.0	80.1	102	65	65
244.5	5.0	29.5	37.6	205	205
	6.3	37.0	47.1	165	165
	8.0	46.7	59.4	130	130
	10.0	57.8	73.7	105	105
	12.5	71.5	91.1	85	85
	14.2	80.6	103	75	75
	16.0	90.2	115	65	65
273	5.0	33.0	42.1	205	205
	6.3	41.4	52.8	160	160
	8.0	52.3	66.6	130	130
	10.0	64.9	82.6	105	105
	12.5	80.3	102	85	85
	14.2	90.6	115	75	75
	16.0	101	129	65	65
323.9	5.0	39.3	50.1	205	205
	6.3	49.3	62.9	160	160
	8.0	62.3	79.4	130	130
	10.0	77.4	98.6	105	105
	12.5	96.0	122	85	85
	14.2	108	138	75	75
	16.0	121	155	65	65

CIRCULAR HOLLOW SECTIONS (CHS)

TABLE 2.18. CIRCULAR HOLLOW SECTIONS (CHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)	
				Profile	Box
Outside Dia	Wall Thickness, t	Mass	Area of Section, A		
mm	mm	kg/m	cm²	m⁻¹	m⁻¹
355.6	6.3	54.3	69.1	160	160
	8.0	68.6	87.4	130	130
	10.0	85.2	109	100	100
	12.5	106	135	85	85
	14.2	120	152	75	75
	16.0	134	171	65	65
406.4	6.3	62.2	79.2	160	160
	8.0	78.6	100	130	130
	10.0	97.8	125	100	100
	12.5	121	155	80	80
	14.2	137	175	75	75
	16.0	154	196	65	65
457.0	6.3	70	89.2	160	160
	8.0	88.6	113	130	130
	10.0	110	140	105	105
	12.5	137	175	80	80
	14.2	155	198	75	75
	16.0	174	222	65	65
508.0	6.3	77.9	99.3	160	160
	8.0	98.6	126	125	125
	10.0	123	156	100	100
	12.5	153	195	80	80
	14.2	173	220	75	75
	16.0	194	247	65	65

SQUARE HOLLOW SECTIONS (SHS)

TABLE 2.19. SQUARE HOLLOW SECTIONS (SHS)

Dimensions to BS EN 10210-2: 2006			Section Factor A/V (Hp/A)	
			3 Sides	4 Sides
Designation				
Size D x D	Wall Thickness, t	Mass	Area of Section, A	
mm	mm	kg/m	cm²	m-1	m-1
40 x 40	3.0	3.41	4-34	275	370
	3.2	3.61	4.60	260	350
	3.6	4.01	5.10	235	315
	4.0	4.39	5.59	215	290
	5.0	5.28	6.73	180	240
50 x 50	3.0	4.35	5.54	270	365
	3.2	4.62	5.88	255	340
	3.6	5.14	6.54	230	305
	4.0	5.64	7.19	210	280
	5.0	6.85	8.73	175	230
	6.3	8.31	10.6	140	190
60 x 60	3.0	5.29	6.74	270	360
	3.2	5.62	7.16	250	335
	3.6	6.27	7.98	225	300
	4.0	6.90	8.79	205	275
	5.0	8.42	10.7	170	225
	6.3	10.3	13.1	140	185
	8.0	12.5	16.0	115	150
70 x 70	3.0	6.24	7.94	265	355
	3.2	6.63	8.44	250	335
	3.6	7.40	9.42	225	300
	4.0	8.15	10.4	205	270
	5.0	9.99	12.7	165	220
	6.3	12.3	15.6	135	180
	8.0	15.0	19.2	110	145
80 x 80	3.0	7.18	9.14	265	350
	3.2	7.63	9.72	250	330
	3.6	8.53	10.9	220	295
	4.0	9.41	12.0	200	270
	5.0	11.6	14.7	165	220
	6.3	14.2	18.1	135	180
	8.0	17.5	22.4	110	145
90 x 90	3.6	9.66	12.3	220	295
	4.0	10.7	13.6	200	265
	5.0	13.1	16.7	160	215
	6.3	16.2	20.7	130	175
	8.0	20.1	25.6	105	140
100 x 100	3.6	10.8	13.7	220	295
	4.0	11.9	15.2	200	265
	5.0	14.7	18.7	160	215
	6.3	18.2	23.2	130	175
	8.0	22.6	28.8	105	140
	10.0	27.4	34.9	90	115

TABLE 2.20. SQUARE HOLLOW SECTIONS (SHS)

Dimensions to BS EN 10210-2: 2006			Section Factor A/V (Hp/A)	
			3 Sides	4 Sides
Designation				
Size D x D	Wall Thickness, t	Mass	Area of Section, A	
mm	mm	kg/m	cm²	m-1	m-1
120 x 120	4.0	14.4	18.4	195	260
	5.0	17.8	22.7	160	215
	6.3	22.2	28.2	130	170
	8.0	27.6	35.2	105	140
	10.0	33.7	42.9	85	115
	12.5	40.9	52.1	70	95
140 x 140	5.0	21.0	26.7	160	210
	6.3	26.1	33.3	130	170
	8.0	32.6	41.6	100	135
	10.0	40.0	50.9	85	110
	12.5	48.7	62.1	70	90
150 x 150	5.0	22.6	28.7	160	210
	6.3	28.1	35.8	125	170
	8.0	35.1	44.8	100	135
	10.0	43.1	54.9	85	110
	12.5	52.7	67.1	70	90
	16.0	65.2	83.0	55	75
160 x 160	5.0	24.1	30.7	160	210
	6.3	30.1	38.3	125	170
	8.0	37.6	48.0	100	135
	10.0	46.3	58.9	85	110
	12.5	56.6	72.1	70	90
	14.2	63.3	80.7	60	80
	16.0	70.2	89.4	55	75
180 x 180	5.0	27.3	34.7	155	210
	6.3	34.0	43.3	125	170
	8.0	42.7	54.4	100	135
	10.0	52.5	66.9	80	110
	12.5	64.4	82.1	65	90
	14.2	72.2	92.0	60	80
	16.0	80.2	102	55	70
200 x 200	5.0	30.4	38.7	155	210
	6.3	38.0	48.4	125	165
	8.0	47.7	60.8	100	135
	10.0	58.8	74.9	85	110
	12.5	72.3	92.1	65	90
	14.2	81.1	103	60	80
	16.0	90.3	115	55	70
250 x 250	5.0	38.3	48.7	155	205
	6.3	47.9	61.0	125	165
	8.0	60.3	76.8	100	130
	10.0	74.5	94.9	80	105
	12.5	91.9	117	65	85
	14.2	103	132	60	75
	16.0	115	147	55	70

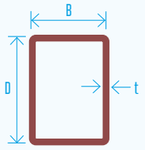
SQUARE HOLLOW SECTIONS (SHS)

TABLE 2.21. SQUARE HOLLOW SECTIONS (SHS)

Dimensions to BS EN 10210-2: 2006			Section Factor A/V (Hp/A)	
			3 Sides	4 Sides
Designation				
Outside Dia	Wall Thickness, t	Mass	Area of Section, A	
mm	mm	kg/m	cm²	m-1	m-1
260 x 260	6.3	49.9	63.5	125	165
	8.0	62.3	80.0	100	130
	10.0	77.7	98.9	80	105
	12.5	95.8	122	65	85
	14.2	108	137	60	75
	16.0	120	153	55	70
300 x 300	6.3	57.8	73.6	125	165
	8.0	72.8	92.8	100	130
	10.0	90.2	115	80	105
	12.5	112	142	65	85
	14.2	126	160	60	75
	16.0	141	179	50	70
350 x 350	8.0	85.4	109	100	130
	10.0	106	135	80	105
	12.5	131	167	65	85
	14.2	148	189	55	75
	16.0	16.6	211	50	70
400 x 400	8.0	97.9	125	100	130
	10.0	122	155	80	105
	12.5	151	192	65	85
	14.2	170	217	55	75
	16.0	191	243	50	70
	20.0	235	300	40	55

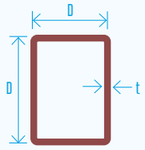
RECTANGULAR HOLLOW SECTIONS (RHS)

TABLE 2.22. RECTANGULAR HOLLOW SECTIONS (RHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)		
				Box		
				3 Sides	3 Sides	4 Sides
Designation						
Size: D x B	Wall Thickness, t	Mass	Area of Section, A			
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹
50 x 30	3.0	3.41	4.34	300	255	370
	3.2	3.61	4.60	285	240	350
	3.6	4.01	5.10	255	215	315
	4.0	4.39	5.59	235	200	290
	5.0	5.28	6.73	195	165	240
60 x 40	3.0	4.35	5.54	290	255	365
	3.2	4.62	5.88	275	240	340
	3.6	5.14	6.54	245	215	305
	4.0	5.64	7.19	225	195	280
	5.0	6.85	8.73	185	160	230
	6.3	8.31	10.6	150	135	190
80 x 40	3.0	5.29	6.74	300	240	360
	3.2	5.62	7.16	280	225	335
	3.6	6.27	7.98	250	200	300
	4.0	6.90	8.79	230	185	275
	5.0	8.42	10.7	190	150	225
	6.3	10.3	13.1	155	125	185
	8.0	12.5	16.0	125	100	150
90 x 50	3.0	6.24	7.94	290	240	355
	3.2	6.63	8.44	275	225	335
	3.6	7.40	9.42	245	205	300
	4.0	8.15	10.4	225	185	270
	5.0	9.99	12.7	185	150	220
	6.3	12.3	15.6	150	125	180
	8.0	15.0	19.2	120	100	150
100 x 50	3.0	6.71	8.54	295	235	355
	3.2	7.13	9.08	275	220	330
	3.6	7.96	10.1	250	200	300
	4.0	8.78	11.2	225	180	270
	5.0	10.8	13.7	185	150	220
	6.3	13.3	16.9	150	120	180
	8.0	16.3	20.8	120	100	145
	10.0	19.6	24.9	100	80	120
100 x 60	3.0	7.18	9.14	285	240	350
	3.2	7.63	9.72	270	230	330
	3.6	8.53	10.9	240	205	295
	4.0	9.41	12.0	220	185	270
	5.0	11.6	14.7	180	150	220
	6.3	14.2	18.1	145	125	180
	8.0	17.5	22.4	120	100	145
120 x 60	3.6	9.66	12.3	245	195	300
	4.0	10.7	13.6	220	180	265
	5.0	13.1	16.7	180	145	215
	6.3	16.2	20.7	145	120	175
	8.0	20.1	25.6	120	95	140
	10.0	24.3	30.9	100	80	120

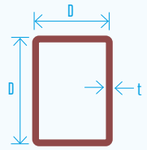
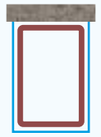
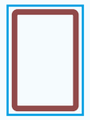
RECTANGULAR HOLLOW SECTIONS (RHS)

TABLE 2.23. RECTANGULAR HOLLOW SECTIONS (RHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)		
				Box		
				3 Sides	3 Sides	4 Sides
Designation						
Size: D x B	Wall Thickness, t	Mass	Area of Section, A			
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹
120 x 80	3.6	10.8	13.7	235	205	295
	4.0	11.9	15.2	210	185	265
	5.0	14.7	18.7	175	150	215
	6.3	18.2	23.2	140	120	175
	8.0	22.6	28.8	115	100	140
	10.0	27.4	34.9	95	80	115
150 x 100	4.0	15.1	19.2	210	185	260
	5.0	18.6	23.7	170	150	215
	6.3	23.1	29.5	135	120	170
	8.0	23.9	36.8	110	95	135
	10.0	35.3	44.9	90	80	115
	12.5	42.8	54.6	75	65	95
150 x 125	4.0	16.6	21.2	200	190	260
	5.0	20.6	26.2	165	155	210
	6.3	25.6	32.6	130	125	170
	8.0	32.0	40.8	105	100	135
	10.0	39.2	49.9	85	80	110
	12.5	47.7	60.8	70	70	90
160 x 80	4.0	14.4	18.4	220	175	260
	5.0	17.8	22.7	180	145	215
	6.3	22.2	28.2	145	115	170
	8.0	27.6	35.2	115	95	140
	10.0	33.7	42.9	95	75	115
	12.5	40.9	52.1	80	65	95
200 x 100	5.0	22.6	28.7	175	140	210
	6.3	28.1	35.8	140	115	170
	8.0	35.1	44.8	110	90	135
	10.0	43.1	54.9	95	75	110
	12.5	52.7	67.1	75	60	90
	16.0	65.2	83.0	60	50	75
200 x 120	5.0	24.1	30.7	170	145	210
	6.3	30.1	38.3	140	115	170
	8.0	37.6	48.0	110	95	135
	10.0	46.3	58.9	90	75	110
	12.5	56.6	72.1	75	65	90
200 x 150	5.0	26.5	33.7	165	150	210
	6.3	33.0	42.1	135	120	170
	8.0	41.4	52.8	105	95	135
	10.0	51.0	64.9	80	80	110
	12.5	62.5	79.6	70	65	90
	14.2	70.0	89.2	65	60	80
	16.0	77.7	99.0	55	55	70

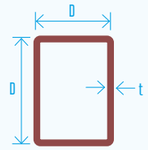
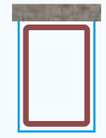
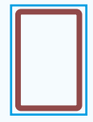
RECTANGULAR HOLLOW SECTIONS (RHS)

TABLE 2.24. RECTANGULAR HOLLOW SECTIONS (RHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)		
				Box		
				3 Sides 	3 Sides 	4 Sides 
Designation						
Size: D x B	Wall Thickness, t	Mass	Area of Section, A			
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹
250 x 100	5.0	26.5	33.7	180	135	210
	6.3	33.0	42.1	145	110	170
	8.0	41.4	52.8	115	85	135
	10.0	51.0	64.9	95	70	110
	12.5	62.5	79.6	75	60	90
	142	70.0	89.2	70	50	80
	16.0	77.7	99.0	65	45	70
250 x 150	5.0	30.4	38.7	170	145	210
	6.3	38.0	48.4	135	115	165
	8.0	47.7	60.8	110	90	135
	10.0	58.8	74.9	90	75	110
	12.5	72.3	92.1	75	60	90
	14.2	81.1	105	65	55	80
	16.0	90.3	118	60	50	70
250 x 200	10.0	66.7	84.9	85	80	110
	12.5	82.1	105	70	65	90
	14.2	92.3	115	60	55	80
260 x 140	5.0	30.4	38.7	170	140	210
	6.3	38.0	48.4	140	115	165
	8.0	47.7	60.8	110	90	135
	10.0	58.8	74.9	90	75	110
	12.5	72.3	92.1	75	60	90
	14.2	81.1	103	65	55	80
	16.0	90.3	115	60	50	70
300 x 100	5.0	30.4	38.7	180	130	210
	6.3	38.0	48.4	145	105	165
	8.0	47.7	60.8	115	85	135
	10.0	58.8	74.9	95	70	110
	12.5	72.3	92.1	80	55	90
	14.2	81.1	103	70	50	80
	16.0	90.3	115	65	45	70
300 x 150	8.0	54.0	68.8	110	90	130
	10.0	66.7	84.9	90	70	110
	12.5	82.1	105	75	60	90
	14.2	92.3	118	65	55	80
	16.0	103	131	60	50	70
300 x 200	5.0	38.3	48.7	165	145	205
	6.3	47.9	61.0	135	115	165
	8.0	60.3	76.8	105	95	130
	10.0	74.5	94.9	85	75	105
	12.5	91.9	117	70	60	85
	14.2	103	132	60	55	75
	16.0	115	147	55	50	70

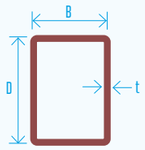
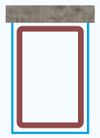
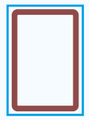
RECTANGULAR HOLLOW SECTIONS (RHS)

TABLE 2.25. RECTANGULAR HOLLOW SECTIONS (RHS)

Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)		
				Box		
				3 Sides 	3 Sides 	4 Sides 
Designation						
Size: D x B	Wall Thickness, t	Mass	Area of Section, A			
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹
300 x 250	6.3	52.8	67.3	130	120	165
	8.0	66.5	84.8	100	95	130
	10.0	82.4	105	85	80	105
	12.5	102	130	65	65	85
	14.2	115	146	60	55	75
	16.0	128	163	55	50	70
350 x 150	6.3	47.9	61.0	140	110	165
	8.0	60.3	76.8	110	85	130
	10.0	74.5	94.9	90	70	105
	12.5	91.1	117	75	55	85
	14.2	103	132	65	50	75
	16.0	115	147	60	45	70
350 x 250	6.3	57.8	73.6	130	115	165
	8.0	72.8	92.8	105	95	130
	10.0	90.2	115	85	75	105
	12.5	112	142	70	60	85
	14.2	126	160	60	55	75
	16.0	141	179	55	50	70
400 x 120	6.3	49.9	63.5	145	100	165
	8.0	62.8	80.0	115	80	130
	10.0	77.7	98.9	95	65	105
	12.5	95.8	122	75	55	135
	14.2	108	137	70	50	80
	16.0	120	153	65	45	70
400 x 150	6.3	52.8	67.3	145	105	165
	8.0	66.5	84.8	115	85	130
	10.0	82.4	105	95	70	105
	12.5	102	130	75	55	135
	14.2	115	146	65	50	75
	16.0	128	163	60	45	70
400 x 200	6.3	57.8	73.6	140	110	165
	8.0	72.8	92.8	110	90	130
	10.0	90.2	115	90	70	105
	12.5	112	142	70	60	135
	14.2	126	160	65	50	75
	16.0	141	179	60	45	70
400 x 300	8.0	85.4	109	105	95	130
	10.0	106	135	85	75	105
	12.5	131	167	70	60	135
	14.2	148	189	60	55	75
	16.0	166	211	55	50	70

RECTANGULAR HOLLOW SECTIONS (RHS)

TABLE 2.26. RECTANGULAR HOLLOW SECTIONS (RHS)

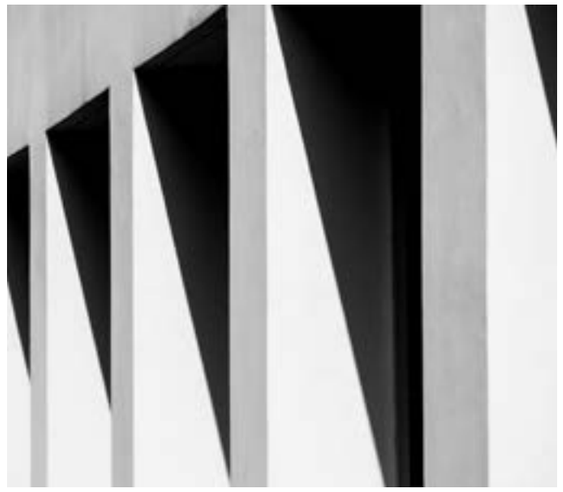
Dimensions to BS EN 10210-2: 2006				Section Factor A/V (Hp/A)		
				Box		
				3 Sides	3 Sides	4 Sides
						
Designation						
Size: D x B	Wall Thickness, t	Mass	Area of Section, A			
mm	mm	kg/m	cm^2	m^{-1}	m^{-1}	m^{-1}
450 x 250	8.0	85.4	109	105	90	130
	10.0	106	135	85	70	105
	12.5	131	167	70	60	85
	14.2	148	189	65	50	75
	16.0	166	211	55	45	70
500 x 200	8.0	85.4	109	110	85	130
	10.0	106	135	90	70	105
	12.5	131	167	75	55	85
	14.2	148	189	65	50	75
	16.0	166	211	60	45	70
500 x 300	8.0	97.9	125	105	90	130
	10.0	122	155	85	75	105
	12.5	151	192	70	60	85
	14.2	170	217	60	50	75
	16.0	191	243	55	45	70
	20.0	235	300	45	40	55

FIRE PROTECTION OF STRUCTURAL REINFORCED CONCRETE

Promat direct fixed board upgrades of the fire resistance of concrete to comply with either BS 8110-2:1985 or EN 1992-1-2: 2004

Concrete Upgrades

Existing or newly installed concrete structures, including beams, columns, walls & slabs, all have an inherent fire resistance, dependent upon their construction. There are, however, instances where the concrete may no longer meet current fire resistance requirements, where the building is undergoing a change of use, and fire resistance needs to be increased. This can result in the concrete structure being either of insufficient thickness or with insufficient concrete cover over the reinforcement to meet the appropriate design code being applied to the building.



Design Considerations

Before the level of additional fire protection can be determined the following points should be considered when determining the correct specification to ensure that structural concrete will provide the required fire performance.

Concrete Density

Density not only affects the concrete's strength but also its insulation properties and susceptibility to spalling when exposed to fire.

Concrete Moisture Content

Depending on the concrete type, concrete can spall when exposed to fire if its moisture content is greater than 2-3%.

Concrete Thickness and Cover to Reinforcing Bars

The overall slab thickness will contribute to the strength and insulation of the structure, but the concrete cover to the closest reinforcing bars to the surface is also critical.

This information may be included on the structural engineer's design drawings for the frame, or alternatively a structural investigation report may have to be commissioned to determine the size of the structure and depth of concrete cover.

If the thickness of concrete cover to the reinforcement is not available, or size of the structure is unknown; then advice must be taken from the project structural engineer to determine the requirement for additional protection.

Supporting Steelwork

Care should be taken that any structural steel supporting a concrete slab is adequately protected against fire.

PROMATECT®-H

Promat have developed a fire tested solution for upgrading the fire performance of existing concrete structures using Promat PROMATECT®-H, a specialist calcium silicate fire protection board. Results from fire tests and assessments show that:

- 12mm thick PROMATECT®-H board can give the equivalent fire protection of up to 59mm thick concrete when upgrading concrete beams and columns and 64mm when upgrading concrete slabs and walls.
- 25mm thick PROMATECT®-H board can give the equivalent fire protection of up to 90mm thick concrete when upgrading concrete beams and columns and 101mm when upgrading concrete slabs and walls.

(Board thickness is dependent on the fire protection period required).

Please note that this solution does not increase the structural performance, it is only to upgrade the fire resistance.

PROMATECT®-H IS A NON COMBUSTIBLE MATRIX ENGINEERED MINERAL BOARD REINFORCED WITH SELECTED FIBRES AND FILLERS. IT DOES NOT CONTAIN FORMALDEHYDE. PROMATECT®-H IS RESISTANT TO THE EFFECTS OF MOISTURE AND WILL NOT PHYSICALLY DETERIORATE WHEN USED IN DAMP OR HUMID CONDITIONS, ALTHOUGH PROMATECT®-H IS NOT DESIGNED FOR APPLICATION IN AREAS SUBJECT TO CONTINUAL DAMP OR HIGH TEMPERATURES. PROMATECT®-H IS OFF-WHITE IN COLOUR AND HAS A SMOOTH FINISH ON ONE FACE WITH A SANDED REVERSE FACE. THE BOARD CAN BE LEFT UNDECORATED OR EASILY FINISHED WITH PAINTS.

Advantages

- A fully fire tested solution which has been independently assessed for upgrading concrete structures to provide up to 240 minutes fire resistance. ITB Assessment Report No. 02835.2/15/Z00NZP (beams & columns) & 02835.1/15/Z00NZP (slabs & walls).
- Additional fire protection is applied in a single board layer, giving a space efficient solution with no requirement for wet trades.
- An A1 non-combustible, robust, calcium silicate board that can be installed in semi-exposed environments such as within an external cavity, car park or plant room.
- PROMATECT®-H contains no gypsum, inorganic fibres, or formaldehyde.
- Off-cuts can be disposed of without special handling.
- Boards will not rot, deteriorate or decay.
- Fast-track, dry installation.
- High compressive strength: Galvanized steel partition sections can be installed directly up to the face of the board and through-fixed to the concrete substrate.
- Boards can be easily worked and decorated using conventional tools and finishes.

Calculating the Additional Fire Protection Required

Protection to reinforced concrete

There are two steps when determining the thickness of Promat board to upgrade the fire protection of concrete structural elements to meet either the design code BS 8110-2: 1985 or EN 1992-1-2: 2004.

Step 1

The overall size of the beam, column, slab or wall and thickness of concrete cover to the reinforcement are used to meet the fire resistance requirements of reinforced and pre-stressed concrete elements. There are different options on how to calculate these requirements. BS 8110-2: 1985 or EN 1992-1-2: 2004 give certain "deemed to satisfy" fire performance criteria for concrete elements in relation to the dimensions of the concrete element and the thickness of cover to the reinforcement, which are given in 'look up' Tables in either of the codes. EN 1992-1-2: 2004 also includes an alternative, more complex calculation method, which needs specialist software to complete.

A structural engineer will generally use information given in the codes to determine the minimum dimensions and the thickness of the cover to reinforcement of each element that would be needed to allow the concrete element to meet the required fire protection period. This evaluation should consider the density and condition of the existing concrete and the design load level in a fire situation (e.g. to account for load combinations, compressive strength and bending loads).

Promat cannot undertake any structural engineering calculations or provide structural engineering advice.

Step 2

From the evaluation and site data, the structural engineer will calculate any deficiencies in the thickness/depth/dimensions of concrete. Once the deficiency is known, the equivalent thickness of PROMATECT®-H can be determined from the tables on the following pages.

Concrete Beams and Columns

The equivalent concrete thickness is calculated, based on product fire testing using the test standard for materials for protection of concrete EN 13381-3. Part 3 covers applied protection to concrete members.

ITB Assessment Report No. 02835.2/15/Z00NZP (beams & columns) is an assessment to EN 13381-3 and the Report covers single layer protection of either 12mm or 25mm thick. The report determines the equivalent concrete thickness for various fire resistance periods from 30 to 240 minutes. These are given in Table 2.27 Page 92 & Table 2.28 Page 93.

For columns, where there is a risk of minor impact, metal angles must be fixed up to the appropriate height to protect the corners. Angles must be anchored to the concrete substrate and ideally sized so that the anchors coincide with the fixing points for the Promat boards, minimising the number of fixings.

Cutting and Finishing Details

PROMATECT®-H boards can be cut and finished in accordance with the guidance provided within Section 7 of this Handbook. Etex Building Performance recommends that all cutting be carried out in well ventilated spaces using dust extraction facilities, following the guidance given in the product Safety Information Sheet (SIS).

PROMATECT®-H
CONCRETE COLUMN UPGRADES

DETAIL 2.36

System Name
RC PRO-H-30-240-001S: Concrete Column upgrades.

Fire Performance
Up to 240 minutes in accordance with EN 13381-3

Certification Reference
ITB Assessment Report No. 02835.2/15/Z00NZP

Drawing Reference
RC PRO-H-30-240 001

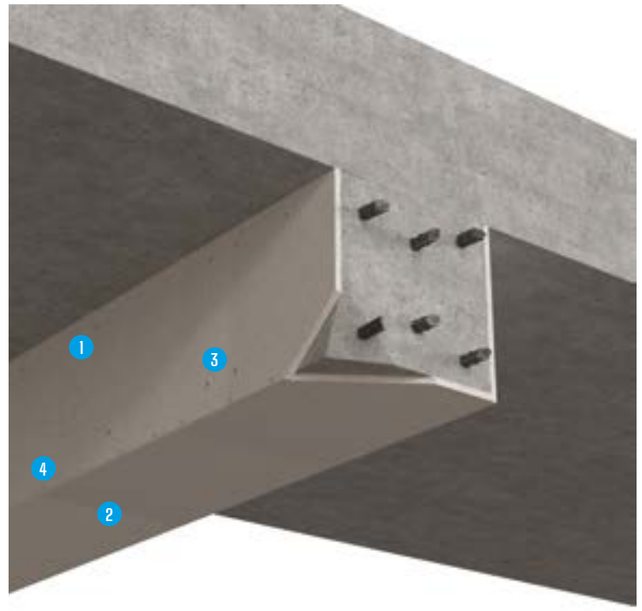
Instructions
Protection is installed using nail anchors to fix the boards to the column, with boards edge-stapled to each other.

1. Promat PROMATECT®-H boards, 12mm or 25mm thick.
2. Board joints finished using Promat Moisture Resistant Ready Mixed Joint Filler.
3. Fisher FNA II – 6 x 30.30 nail anchors, fixed into pre-drilled pilot holes spaced at 400mm centres, depth to allow for a minimum anchorage of 30mm.
4. Edge fixing: Chisel point galvanised steel staples, minimum 30mm/10.5mm/1.4mm for 12mm thick boards, minimum 50mm/10.5mm/1.4mm for 25mm thick boards.
5. Optional metal angles to the appropriate height for corner impact protection. Angles must be anchored to the concrete and ideally sized so that the anchors coincide with the board fixing points.

Table 2.27 - Report Assessment No. 02835.2/15/Z00NZP PROMATECT®-H. Equivalent concrete thickness for 12mm and 25mm thick PROMATECT®H for various fire periods.

Concrete beams/columns	Equivalent thickness (mm)					
Thickness of board (mm)	Exposure time (minutes)					
	30	60	90	120	180	240
12	47	56	59	58	-	-
25	58	83	90	89	89	87

PROMATECT®-H
CONCRETE BEAM UPGRADES



DETAIL 2.37

System Name
RC PRO-H-30-240 002S: Concrete Beam upgrades.

Fire Performance
Up to 240 minutes in accordance with EN 13381-3

Certification Reference
ITB Assessment Report No. 02835.2/15/Z00NZP

Drawing Reference
RC PRO-H-30-240 002

Instructions
Protection is installed using nail anchors to fix the boards to the beam, with boards edge-stapled to each other.

1. Promat PROMATECT®-H boards, 12mm or 25mm thick.
2. Board joints finished using Promat Moisture Resistant Ready Mixed Joint Filler.
3. Fisher FNA II – 6 x 30.30 nail anchors, fixed into pre-drilled pilot holes spaced at 400mm centres, depth to allow for a minimum anchorage of 30mm.
4. Edge fixing: Chisel point galvanised steel staples, minimum 30mm/10.5mm/1.4mm for 12mm thick boards, minimum 50mm/10.5mm/1.4mm for 25mm thick boards.

Table 2.28 - Report Assessment No. 02835.2/15/Z00NZP PROMATECT®-H. Equivalent concrete thickness for 12mm and 25mm thick PROMATECT®H for various fire periods.

Concrete beams/columns	Equivalent thickness (mm)					
Thickness of board (mm)	Exposure time (minutes)					
	30	60	90	120	180	240
12	47	56	59	58	-	-
25	58	83	90	89	89	87

Concrete slabs and walls

The equivalent concrete thickness is calculated, based on product fire testing using the test standard for materials for protection of concrete EN 13381-3. Part 3 covers applied protection to concrete members.

ITB Assessment Report No. 02835.1/15/Z00NZP (slabs & walls) is an assessment to EN 13381-3 and the report covers single layer protection of either 12mm or 25mm thick.

PROMATECT®-H is fixed using Fisher FNA II - 6 x 30/30(6 x 65mm) nail anchors. The report determines the equivalent concrete thickness for various fire resistance periods from 30 to 240 minutes. Table 2.30 on page 96.

Installation Details

Before application, the installer is responsible for inspection and preparation of the substrate. The inspection consists of the verification of the condition of existing surface, which should be flat and level. Where required, if may be necessary to scabble the surface to remove any high points.

Cutting and Finishing Details

PROMATECT®-H boards can be cut and finished in accordance with the guidance provided within Section 7 of this Handbook.

Etex Building Performance recommends that all cutting be carried out in well ventilated spaces using dust extraction facilities, following the guidance given in the product Safety Data Sheet (SDS).

PROMATECT®-H
CONCRETE SOFFIT UPGRADES

DETAIL 2.38

System Name
CS PRO-H-30-240 001S: Concrete Soffit upgrades.

Fire Performance
Up to 240 minutes in accordance with EN 13381-3

Certification Reference
ITB Assessment Report No. 02835.1/15/Z00NZP

Drawing Reference
Drawing Reference CS PRO-H-30-240 001

Instructions

Protection is installed using nail anchors to fix the boards to the soffit, with fire rated glue dabs at each anchor location.

1. Promat PROMATECT®-H boards, 12mm or 25mm thick.
2. Board joints finished using Promat Moisture Resistant Ready Mixed Joint Filler.
3. Promat PROMACOL® K84/500 100mm diameter dabs between boards and concrete at the nail anchor locations.
4. Fisher FNA II – 6 x 30.30 nail anchors, fixed into pre-drilled pilot holes spaced at 400mm centres, depth to allow for a minimum anchorage of 30mm. The PROMATECT®-H boards are fixed to the slab or wall using Fisher FNA II - 6 x 30/30 nail anchors and 100mm diameter PROMAT PROMACOL® K84/500 dabs between boards and concrete at the nail anchor locations. Pilot holes should be pre-drilled not less than 50 mm from the edge of the boards and concrete. 100mm diameter PROMAT PROMACOL® K84/500 dabs are applied to the substrate. Boards are fixed to the concrete using Fisher FNA II - 6 x 30/30 nail anchors: 1 anchor per 0.4m² of board (minimum 8 fixings per board). Pre-drilled holes need to allow for a minimum effective anchorage depth of 30mm. The anchors are pushed through the board and hammer fixed using 2 to 4 blows.

Table 2.29 - Report Assessment No. 02835.2/15/Z00NZP PROMATECT®-H.
Equivalent concrete thickness for 12mm and 25mm thick PROMATECT®H for various fire periods.

Concrete slabs/walls	Equivalent thickness (mm)					
Thickness of board (mm)	Exposure time (minutes)					
	30	60	90	120	180	240
12	43	56	62	64	38	-
25	52	74	86	92	98	101

PROMATECT®-H
CONCRETE WALL UPGRADES

DETAIL 2.38

System Name
CW PRO-H-30-240 001S: Concrete Wall upgrades.

Fire Performance
Up to 240 minutes in accordance with EN 13381-3

Certification Reference
ITB Assessment Report No. 02835.1/15/Z00NZP

Drawing Reference
CW PRO-H-30-240 001

Instructions
Protection is installed using nail anchors to fix the boards to the wall, with fire rated glue dabs at each anchor location.

1. Promat PROMATECT®-H boards, 12mm or 25mm thick.
2. Board joints finished using Promat Moisture Resistant Ready Mixed Joint Filler.
3. Promat PROMACOL® K84/500 100mm diameter dabs between boards and concrete at the nail anchor locations.
4. Fisher FNA II – 6 x 30.30 nail anchors, fixed into pre-drilled pilot holes spaced at 400mm centres, depth to allow for a minimum anchorage of 30mm.

Table 2.30 - Report Assessment No. 02835.1/15/Z00NZP PROMATECT®-H. Equivalent concrete thickness for 12mm and 25mm thick PROMATECT®-H for various fire periods.

Concrete slabs/walls	Equivalent thickness (mm)					
Thickness of board (mm)	Exposure time (minutes)					
	30	60	90	120	180	240
12	43	56	62	64	38	-
25	52	74	86	92	98	101

NOTES

Promat®

GB Orderline
For placing orders, delivery enquiries and local stockists etc.
0800 373 636 (Select option 1)
sales.construction@promat.co.uk

Customer Support
For any problems with invoices or deliveries
0800 373 636 (Select option 2)
customersupport@promat.co.uk

Technical Services
For technical support and advice
0800 145 6033 (Select option 2)
technical@promat.co.uk

Etex Building Performance Limited
Marsh Lane, Easton-in-Gordano,
Bristol, BS20 0NE
01275 377 773

promat.com/en-gb/construction

0672-PRO V1(a)/12/2025