

Promat



PROMATECT^{fi} 250 PROMAXON^{fi} Technology Steelwork Fire Protection



A NEW GENERATION OF FIRE PROTECTION BOARDS

PROMATECT[®] 250 is one of a new generation of non-combustible mineral bound PROMAXON[®] boards. It has a smooth matt upper surface and is off-white in colour. Using Promat's PROMAXON[®] technology, PROMATECT[®] 250 has a superior fire performance, workability, and surface finish to most other fire protection boards. Its high fire performance generally means lower thicknesses can be used, leading to reduced costs and lower weight.

This brochure describes how PROMATECT[®] 250 is used for the fire protection of structural steel. Please consult Promat for information on other applications for PROMATECT[®] 250.

PROMAXON[®] Technology

Non-combustible autoclaved calcium silicate boards have been used for many years in fire protection applications. Their composition provides a high degree of strength, dimensional stability, and stability in fire. Promat already manufacture four such boards, including PROMATECT[®]-L and PROMATECT[®]-L500. These two boards incorporate synthetic hydrated calcium silicate spheres called PROMAXON[®]. The PROMAXON[®] spheres help to hold each board together, and also to retain water in fire conditions, thus contributing to the overall fire insulation of the board. PROMATECT[®] 250 also uses PROMAXON[®] spheres but combines them with a mineral matrix to improve the fire insulation performance even further.

The PROMAXON[®] technology has therefore enabled Promat to introduce an excellent high fire performance board for column and beam encasement with up to 2 hours fire resistance, and offers the following benefits:

- **SUPERIOR FIRE PERFORMANCE**
Resulting from a double cooling effect.
- **IMPROVED STRENGTH**
Stronger, so it can be used in most areas.
- **IMPROVED FIRE INSULATION**
Allowing thinner and lighter constructions than other fire boards.
- **NON-COMBUSTIBLE**
Meets the standard set by National Building Regulations.
- **IMPACT RESISTANT**
Less brittle than other fire boards.
- **COST EFFECTIVE**
Competitive system costs.
- **BETTER WORKABILITY**
Easier to scribe, cut and fix.
- **IMPROVED SURFACE FINISH**
Smooth and off-white.

Physical Properties

Density (dry)	Nominal 750 kg/m ³
Combustibility (BS 476: Part 4)	Non-combustible
Building regulation classification	Non-combustible Material of limited combustibility Class 0
Thermal conductivity	0.189 W/mK
Flexural strength, F _{rupture} Longitudinal (dry)	3.0 N/mm ²
Tensile strength, F _{rupture} Longitudinal (dry)	1.0 N/mm ²
Compressive strength (dry)	4.7 N/mm ²

NOTE: The properties in this table are mean values given for guidance only. If certain properties are critical for a particular application it is advisable to consult Promat.

Handling

Boards should be carried on their edge and not dropped on to the ground, trestles etc.

Board Sizes & Weights

Thickness (mm)	Board size (mm)	Approx. weight (kg/m ²)
15	2400 x 1200	10.5
20	2400 x 1200	14
25	2400 x 1200	17.5
30	2400 x 1200	21

Workability

- **CUTTING**
Boards can be cut using a sheet saw with hardened steel teeth, a jig-saw, or a power saw with tungsten carbide tipped blades. It can also be scribed and broken over a straight edge.
- **PLANING & SANDING**
The edges of the board are easily planed, bevelled etc, using rasps or a surform. Conventional papers are adequate for sanding.
- **DRILLING**
Generally, the boards do not require to be pre-drilled, but if they are to be drilled this can be carried out with hand operated or power drills with high speed drill bits.
- **STAPLING**
The boards can be readily fixed using steel wire staples. If the preferred fixing method varies from that shown in the relevant detail on **pages 6 and 7** please consult the Promat Technical Department. Generally, fixings should not be closer than 40mm from the corners of each board.
- **JOINTING**
The board joints do not have to be filled for fire protection purposes providing any joint gap does not exceed 2-3mm. If the board is to be painted or plastered, the joints can be filled with either PROMAPLAST[®] or a standard gypsum joint filler. The latter will need to be installed as per plaster manufacturer's recommendations.
- **SKIM COATING**
Please consult the Promat Technical Department.
- **PAINTING**
With water based paints, at least two coats are required. A slightly diluted first coat should be used. In areas that are liable to get knocked or scratched and for oil based paints, a suitable alkali resisting primer should be used. The coating manufacturer's recommendations should be followed at all times.
- **PAPERING & TILING**
Please consult the Promat Technical Department.

Storage

All boards should be stored flat, clear of the ground and well protected from the weather and physical damage. The packing provided should not be regarded as sufficient protection for storage in the open.

Health & Safety, Waste Management

A health and safety data sheet is available from the Promat Technical Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Limitations

PROMATECT[®] 250, if fixed in accordance with Promat recommendations, will not sag or fall away, providing the area is not permanently wet, or areas of high humidity. The product is not suitable for external use without additional protection against the elements being applied.

Hp/A Section Factor

The degree of fire protection depends on the Hp/A section factor for the steel section. The Hp/A factor is a function of the area of the steel exposed to the fire and the mass of the steel section. The higher the Hp/A, the faster the steel section heats up, and so the greater the thickness of fire protection material required.

Box Protection

In the case of box protection, Hp is the sum of the inside dimensions of the smallest possible rectangular or square encasement of the steel section (except for circular hollow sections) as shown below.

Where a steel section abuts, or is built into a fire resisting wall or floor, the surface in contact with, or the surface within the wall or floor, is ignored when calculating HP, assuming the surface is itself part of a fire resistance structure.

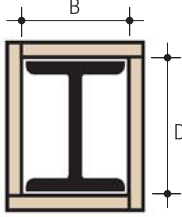

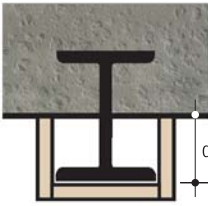
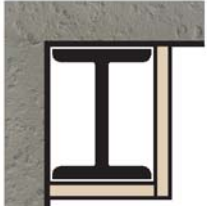
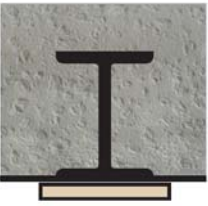
However, the value A is always the total cross-sectional area of the steel section.

Encasements following the profile of the steel section will generally have a higher Hp/A section factor than a box encasement. One exception is circular hollow sections. Please contact Promat 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 Hp/A values calculated for 3 or 4-sided box protection.

The Promat Technical Department is pleased to calculate Hp/A section factors and required board thicknesses on request.

Hp for universal beams, universal columns, RSJ s and other sections

Cased on:-	4 sides	3 sides	3 sides	2 sides	1 side
					
Hp =	2 B + 2 D	B + 2 D	B + 2 d	B + D	B

NOTE: For partially exposed members, the A value is still the total cross sectional area of the section being protected.

For example: Steel beam, serial size 406mm x 178mm x 54kg/m to be encased on three sides.

Serial size = 406mm x 178mm

Actual size = 406.2mm x 177.6mm

Hp = B + 2 D = 177.6 + 402.6 + 402.6 = 982.8mm (0.9828m)

A = 68.1cm² (0.00681m²)

Hp/A = 0.9828 / 0.00681 = 144.3 = 145m⁻¹

The value of A, the cross-sectional area, can be obtained either from steelwork tables or by accurate measurement. However, if the mass per metre is known then the Hp/A value can be calculated as below:

$$\frac{Hp}{A} = \frac{7850 \times Hp}{W}$$

Where W = Mass of per metre (kg/m)

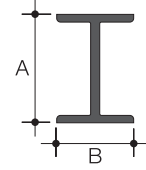
Where 7850 = Nominal density of steel

For a complete list of Hp/A tables for steelwork encasements please contact Promat for a copy of Application & Technical Manual 2002.

Encasements to Steelwork

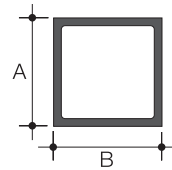
- Only general information can be provided in this document. It is recommended that Promat Technical Department is contacted to confirm details that are not covered.
- The fixing methods are suitable for steel sections up to 686mm deep and 325mm wide. For larger sections and when protecting multiple sections within a single encasement, please consult Promat Technical Department.
- Where a column cladding box encasement abuts a beam protected with a profiled fire protection system e.g. spray, the column webs should be sealed at the junction using PROMATECT[®] 250.
- Whilst the PROMATECT[®] 250 system is not recommended for the fire protection of external steelwork, providing it is fixed in dry conditions the casing can withstand exposure to rain or site water spillages for a few weeks, after which it should be protected from exposure to water. If the cladding is likely to get severely wetted in the first 2 or 3 days after installation, protection from the weather should be employed.
- Tables with higher critical temperatures are referred to on [page 8](#). These tables will allow for thinner boards to be used if subject to a fire engineered design.

Table 1: PROMATECT^{fi} 250 Universal Column Cladding for Up to 2 hours in Accordance With the Requirements of AS 1530: Part 4: 1997 (4-sided Universal Columns)



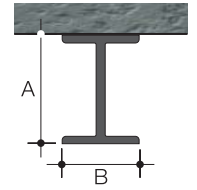
Section	A	B	Weight/M	Hp/A	Critical temperature 550°C			
					30 mins.	60 mins.	90 mins.	120 mins.
310UC158	372	311	158.0	68	15	15	15	15
310UC137	321	309	137.0	72	15	15	15	20
310UC118	315	307	118.0	83	15	15	15	20
310UC97	308	305	96.8	99	15	15	15	20
250UC89	260	256	89.0	91	15	15	15	20
250UC73	254	254	73.0	109	15	15	15	25
200UC60	210	205	60.0	109	15	15	15	25
200UC52	206	204	52.2	123	15	15	20	25
200UC46	203	203	46.2	138	15	15	20	25
152UC37	162	154	37.2	133	15	15	20	25
152UC30	158	153	30.0	162	15	15	20	30
152UC23	152	152	23.4	205	15	15	25	35
100UC15	97	99	14.8	208	15	15	25	35

Table 2: PROMATECT^{fi} 250 Hollow Section Column Cladding for Up to 2 hours in Accordance With the Requirements of AS 1530: Part 4: 1997 (4-sided Hollow Sections)



Section	A	B	Weight/M	Hp/A	Critical temperature 550°C			
					30 mins.	60 mins.	90 mins.	120 mins.
250 x 250 x 9	250	250	65.9	119	15	15	20	25
250 x 250 x 6	250	250	45	174	15	15	20	30
200 x 200 x 9	200	200	51.8	121	15	15	20	25
200x 200 x 6	200	200	35.6	176	15	15	20	30
200 x 200 x 5	200	200	29.9	210	15	15	25	35
150 x 150 x 9	150	150	37.7	125	15	15	20	25
150 x 150 x 6	150	150	26.2	180	15	15	20	30
150 x 150 x 5	150	150	22.1	213	15	15	25	35
125 x125 x 9	125	125	30.6	128	15	15	20	25
125 x125 x 6	125	125	21.4	183	15	15	20	30
125 x 125 x 5	125	125	18.2	216	15	15	25	35
100 x 100 x 9	100	100	23.5	134	15	15	20	25
100 x 100 x 6	100	100	16.7	188	15	15	25	30
100 x 100 x 5	100	100	14.2	221	15	15	25	35
89 x 89 x 6	89	89	14.7	190	15	15	25	30
89 x 89 x 5	89	89	12.5	224	15	15	25	35
75 x 75 x 6	75	75	12	196	15	15	25	30
75 x75 x 5	75	75	10.3	229	15	15	25	35
65 x 65 x 6	65	65	10.1	202	15	15	25	35
65 x 65 x 5	65	65	8.75	233	15	15	25	35

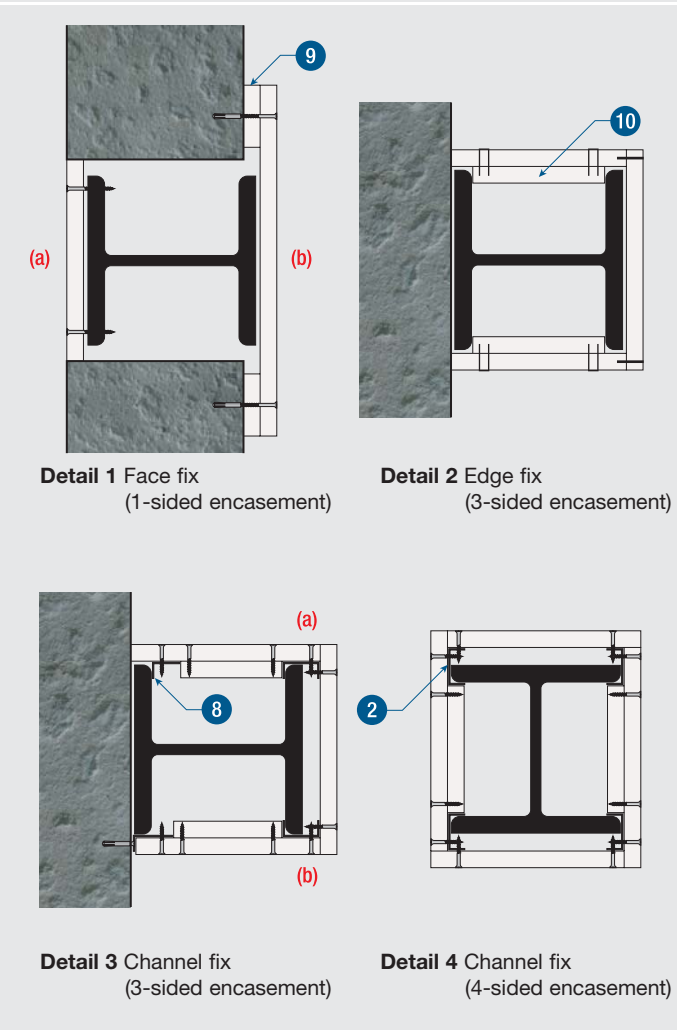
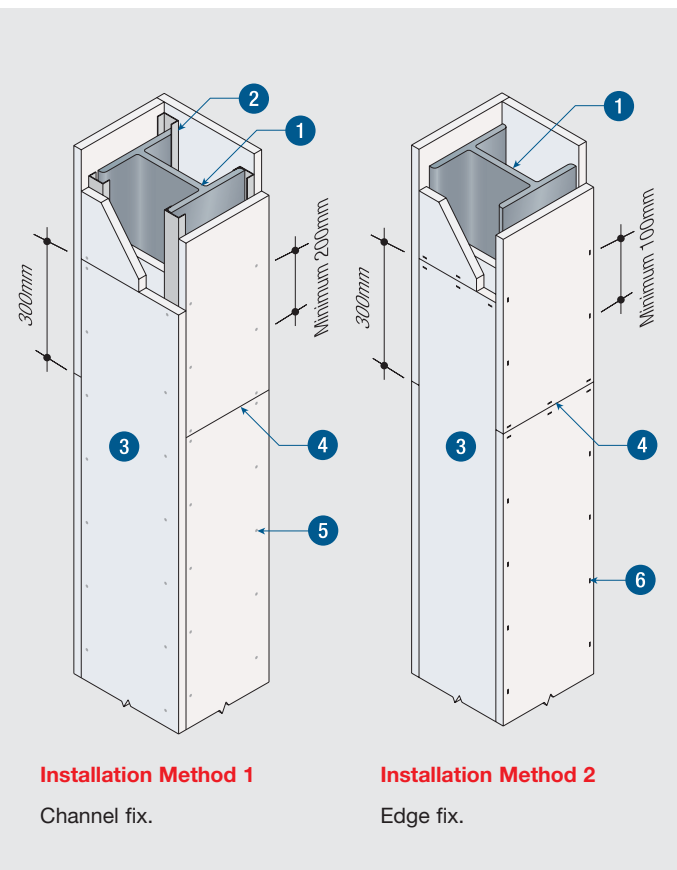
Table 3: PROMATECT[®] 250 Universal Beam Cladding for Up to 2 hours in Accordance With the Requirements of AS 1530: Part 4: 1997



Section	A	B	Weight	Hp/A	Critical temperature 620°C			
					30 mins.	60 mins.	90 mins.	120 mins.
610UB125	612	229	125.0	91	15	15	15	20
610UB113	607	228	113.0	100	15	15	15	25
610UB101	602	228	101.0	111	15	15	15	25
530UB92	533	209	92.4	108	15	15	15	25
530UB82	528	209	82.0	121	15	15	20	25
460UB82	460	191	82.1	106	15	15	15	25
460UB74	457	191	74.6	116	15	15	20	25
460UB67	454	190	67.1	128	15	15	20	25
410UB60	406	178	59.7	130	15	15	20	25
410UB54	403	178	53.7	144	15	15	20	25
360UB57	359	172	57.0	122	15	15	20	25
360UB51	356	172	50.7	137	15	15	20	25
360UB45	352	171	44.7	154	15	15	20	30
310UB46	307	166	46.2	133	15	15	20	25
310UB40	304	165	40.4	150	15	15	20	30
310UB32	313	102	33.0	173	15	15	20	30
250UB37	256	146	37.3	139	15	15	20	25
250UB31	252	146	31.4	162	15	15	20	30
250UB25	248	124	25.7	189	15	15	20	30
200UB30	207	134	29.8	144	15	15	20	25
200UB25	203	133	25.4	167	15	15	20	30
200UB22	202	133	22.3	189	15	15	20	30
200UB18	198	99	18.2	214	15	15	20	30
180UB22	179	90	22.2	158	15	15	20	30
180UB18	175	90	18.1	191	15	15	20	30
180UB16	173	90	16.1	213	15	15	20	30
150UB18	155	75	18.0	168	15	15	20	30
150UB14	150	75	14.0	210	15	15	20	30

This table provides information relating to the 3-sided encasement of steel beams where a concrete deck is directly supported onto the top flange of the beam, where the concrete acts as a heat sink and where the beams are generally not fully loaded, therefore a temperature of 620°C is considered appropriate.

Where the beam supports a floor of a different construction other than plain concrete, this failure temperature may not be applicable. If in doubt, please consult your structural engineer, or your local Promat Technical Department.



The following provides basic details for the cladding of columns. Depending on the type of board material, the area of usage and any allowance that may be required for movement joints etc, it may be necessary to adopt alternative installation methods. Please consult the Promat Technical Department before commencing installation to ensure the correct fixing methods pertinent to the product and the site conditions will be applied.

TECHNICAL DATA

- 1 Steel column.
- 2 Galvanised steel channel 19mm x 38mm x 19mm x 1.6mm or similar. Leg of each channel is located against inner surface of flange. See Detail 4 below.
- 3 PROMATECT[®] 250 board, thickness in accordance with Hp/A-ratio (See Tables 2 and 3, pages 4 and 5. For critical temperature 700°C see Table 4, page 8).
- 4 Horizontal joints are simply butt jointed, cover strips in web side only. Joints in adjacent sides to be staggered minimum 300mm.
- 5 Self-tapping screws at nominal 200mm centres.
- 6 Fixings in accordance with the following table. For further guidance on staple fixing, contact the Promat Technical Department.

Board thickness (mm)	Staples at 100mm centres (mm)
15	44/10/1
20	44/10/1
25	50/10/1
30	60/10/1

NOTE: For 90 and 120-minute applications using single layer board thickness, please consult Promat.

Detail 1 Face fix (1-sided encasement)

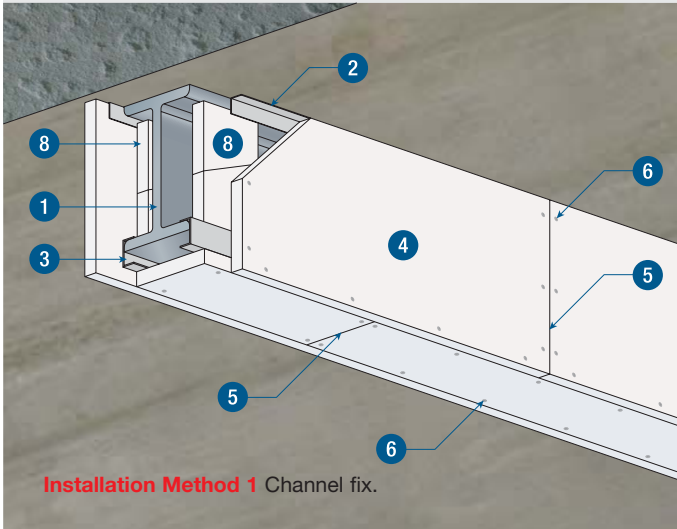
(a) PROMATECT[®] 250 fixed directly to flange. Using two rows of screws at nominal 300mm staggered centres, if acceptable to engineers. Seal edge abutment to wall using PROMASEAL[®] Acrylic Sealant. Alternatively, (b) overlap wall by at least 50mm and screw with metal plugs to wall at 300mm centres. Spacer strips 9 may be required.

Detail 2 Edge fix (3-sided encasement)

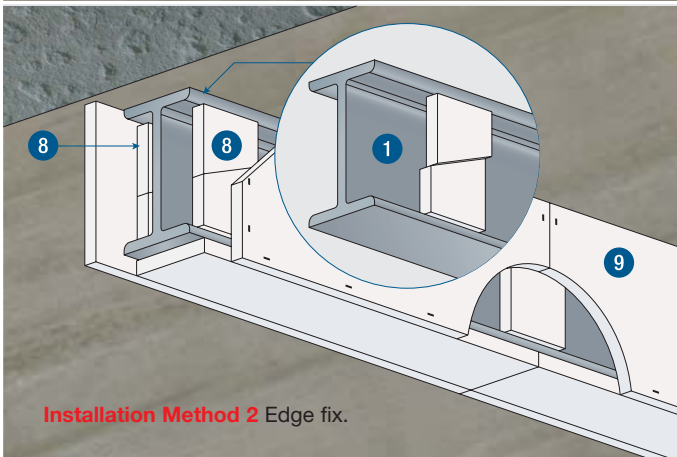
Staple side boards to PROMATECT[®] 250 soldiers 10, which are 100mm wide x board thickness, minimum 15mm thick and which are tightly wedged between the column flanges and are located at nominal 1200mm centres.

Detail 3 Channel fix (3-sided encasement)

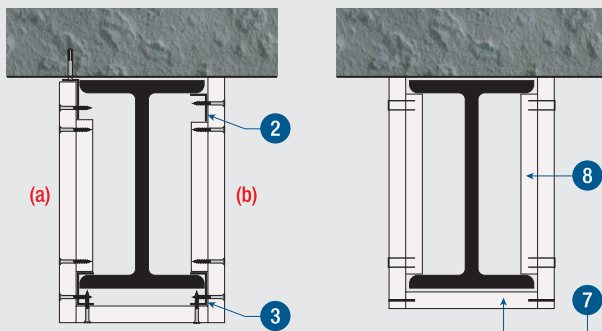
Secure edges of side boards at 200mm centres to continuous galvanised angles 8 fixed either to the flange or to the wall at nominal 500mm centres.



Installation Method 1 Channel fix.



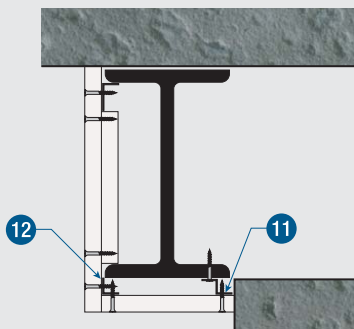
Installation Method 2 Edge fix.



Installation Method 1

Installation Method 2

Detail 1 Cross section through beam encasement



Detail 2 Channel fix (2-sided encasement)

TECHNICAL DATA

- 1 Steel beam.
- 2 Continuous galvanised angle, minimum 32mm x 19mm x 0.9mm or similar, flange or floor slab at 500mm centres.
- 3 Continuous galvanised channel, 19mm x 38mm x 19mm x 1.6mm or similar, resting on lower flange, mechanical fixing to flange not required.
- 4 PROMATECT[®] 250 board, thickness in accordance with Hp/A-ratio (See Table 3, page 5. For critical temperature 700°C see Table 5, page 8).
- 5 Stagger joints in adjacent sides by at least 300mm.
- 6 Screw PROMATECT[®] 250 to angles and channels at 200mm centres and to cover strips at 100mm centres.
- 7 Soffit board staple fixed to the side board using staples from table below.
- 8 PROMATECT[®] 250 soldiers, 100mm wide tightly wedged into the web of the steel at the butt joints. Joints in adjacent sides to be staggered by a minimum of 300mm. For single layer protection the soldier should be the same thickness as the layer used. For double layer protection the soldier thickness should be the same as the thickest layer.
- 9 Secure side boards to soffit boards using fixings in accordance with the Table below. For further guidance on staple fixing, contact the Promat Technical Department.

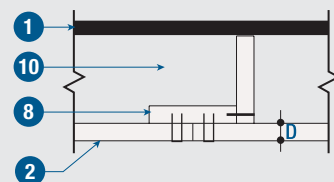
Board thickness (mm)	Staples at 100mm centres (mm)
15	44/10/1
20	44/10/1
25	50/10/1
30	60/10/1

NOTE: For 90 and 120-minute applications using single layer board thickness, please consult Promat.

- 10 For deep beams use nogging and soldier joined to form T section, to which are fixed to the main cladding in Detail 3.

Detail 2 Channel fix

To allow differential movement secure soffit board to continuous galvanised top hat or zed section 11 at 200mm centres. Secure section at 500mm centres. A galvanised angle 12 could replace the normal channel 3. If gap between board soffit and wall exceeds 3mm, fill with PROMASEAL[®] Acrylic Sealant.



Detail 3 Soldier for deep beams

Table 4: PROMATECT[®] 250 Column Cladding for Up to 2%₀₀ hours in Accordance with the Requirements of AS 1530: Part 4: 1997 (for Critical Temperature 700°C)

Board thickness (mm)	Limiting section factor (m ⁻¹) for fire resistance level				
	30 mins.	60 mins.	90 mins.	120 mins.	150 mins.
15	260	260	197	70	NA
20	260	260	260	126	68
25	260	260	260	237	103
30	260	260	260	260	159

NA = Not available

Table 5: PROMATECT[®] 250 Beam Cladding for Up to 2%₀₀ hours in Accordance with the Requirements of AS 1530: Part 4: 1997 (for Critical Temperature 700°C)

Board thickness (mm)	Limiting section factor (m ⁻¹) for fire resistance level				
	30 mins.	60 mins.	90 mins.	120 mins.	150 mins.
15	260	260	128	NA	NA
20	260	260	260	94	NA
25	260	260	260	156	80
30	260	260	260	260	117

NA = Not available

PROMATECT[®] 250 can also be used in engineering solutions for higher or lower temperature values for beams and columns. Please consult Promat for tables of board thickness relevant to alternative failure temperatures.

Important Notes

Promat product data sheets and health and safety data sheets are regularly reviewed and are available on request. The successful use of this product is dependent on a number of factors. As the information contained in this literature can only be of a general nature, it is advisable to consult our technical department if there is any doubt about the correct use of this product in a particular application. Our technical representatives and advisors are available to provide further technical and commercial assistance.

PROMATECT[®] 250 Fire Protection Board is manufactured under a quality management system certified in accordance with ISO 9002.

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