

**Promat**



**PROMATECT®-H**  
**Four Layer Solid/Frameless Internal Partition**



## Introduction

Partitions and external walls are used to separate buildings, enclose compartments and contain fire to provide a barrier to the passage of fire from one side or the other and are able to satisfy each of the relevant fire resistant criteria (integrity, insulation and, if the wall is loadbearing, load bearing capacity) from either side for the prescribed period. The application of partition and external wall systems using Promat boards covers both non loadbearing and loadbearing in commercial, industrial, institutional, residential and high-rise constructions, or in the restoration of existing buildings. Promat's internal partition systems require less material to achieve similar fire resistant level when compared to the industry average wallboard partition systems. The single layer board application leads to simplified construction methods over other equivalents hence increased productivity and reduced overall installation cost.

These partition and external wall systems have been developed by Promat International (Asia Pacific) Ltd. to satisfy standard requirements for intended applications. Such considerations include:

### Time & Cost Effectiveness

Single layer application reduces installation cost and time compared to traditional wallboard partitions.

### Slim Walls

Partitions can be as thin as 40mm.

### Lightweight

Lighter loads on structures compared to industry average wallboard partition systems for equivalent fire resistance.

### Thermal Resistance

Excellent thermal resistance performance.

### Impact Resistant

PROMATECT® 100 partition systems have been tested and assessed for impact and static loading to satisfy specification Cl.8 of the Building Code of Australia (BCA 2006). PROMATECT®-H partition systems have been tested for resistance to impact, stiffness and robustness in accordance with the criteria of BS5234: Part 2.

### Acoustic Performance

Tested and assessed to a range of standards, including ISO140-3 1995, ISO717-1 1996, AS1191 2002, AS/NZS 1276.1, BS5821 1984 and BS2750: Part 3: 1980, to meet the needs of industry. Please refer to [pages 4 and 5](#) for details.

### Fire Resistance Performance

Promat partitions and external wall systems have been extensively tested and assessed in accordance with BS476: Part 22 and AS1530: Part 4 to satisfy the integrity, insulation and where applicable loadbearing capacity (structural adequacy) criteria.

## General Design Considerations

The following points are some of the factors which should be considered when determining the correct specification to ensure a partition or external wall will provide the required design performance under both fire and ambient conditions. Further advice can be obtained from the local Promat office.

### 1. Studwork Design

The design of studwork should be adequate for the height of the partition. The studwork details given in the following specifications will be suitable up to the maximum heights stated. For greater heights the dimension of the framing members could change depending on the factors such as movement and deflection and local approvals. Larger or more frequent frame sections will often improve the fire and structural performance.

The studwork shall be appropriately designed for the applied loads, e.g. wind load, and where applicable structural load in the case of load bearing systems. The framing for the partition systems must be securely fixed back to a substrate that has an equal or greater fire performance than the designed partition. All fixings must be non-combustible and must be those listed in the approval documents. The design shall be in accordance with the relevant British, Australian and/or International Standards.

### 2. Non Loadbearing Partitions

Non loadbearing partitions and external wall systems using Promat boards can be generally divided into framing systems consisting of steel or timber studs and solid partitions. For steel stud systems, selection of suitable stud size shall be in accordance with the maximum partition height given in the stud selection tables. The partition systems in the following pages, where stated, are designed for lateral loads of up to 0.25kPa using the composite action of the frame and boarding.

### 3. Loadbearing Partitions

Loadbearing capacity of featured partition systems in this handbook are calculated in accordance with BS5950-8: 2003 and AS4600: 1996 for load cases defined by AS1170: 2002. The maximum load bearing capacity is given in kN for a given partition height taking into account the reduction in steel strength at elevated temperature.

Loads considered in this manual are for axial compression only. Wind and other loads have not been taken into consideration. For further information on these loads, please contact Promat Technical Department.

### 4. Deflection

Where differential movement is expected between the floor or beam above the construction, and/or the floor below, it is generally advisable to incorporate a deflection head track to ensure undue stress is not placed upon the partition. This also allows for the sagging and deflection a floor or structural steel beam will suffer under fire conditions. Even concrete floors will suffer considerable deflection under fire if exposed for any considerable duration.

Some form of movement joint is also required to allow for the expansion of the studs under fire conditions. A partition will also bow in its centre. As the wall bows, it will naturally get shorter. For this reason alone, use should be made of a top track with long side legs. This will allow the stud to bow and as a result drop down, without the studs dropping out of the head track.

### 5. Movement Joint

Movement stress from dimensional changes due to varying temperature or moisture conditions can cause cracking and other symptoms of distress in partitions. Other external forces such as impact or vibration can directly affect the structural movement of partitions. This movement can be controlled through a variety of design techniques such as introducing perimeter relief and slip connections to reduce the transfer of stress from the structure to other building sub-elements and/or through the use of expansion joints, control joints and construction joints.

In a partition, expansion joints are needed when the partition abuts a rigid mass. A vertical movement joint should be located at maximum 10m centres in long runs of partition. However, by introducing a control joint into a fire-rated partition, it does create an opening for flame and temperature transmission and therefore has to be properly treated with approved fire-stopping material.

*Continued on following page*

### General Design Considerations

*Continued from previous page*

#### 6. Caulking & Service Penetrations

To maintain the fire performance, and where applicable the acoustic performance of the partition system, gaps at perimeter must be appropriately filled with suitable caulking material. PROMASEAL® AN Acrylic Sealant or other tested fire and acoustic rated material of equivalent or better performance must be used.

Care needs to be taken in detailing a suitable fire-stopping system around any penetration of the partition by services to ensure a) the fire-stopping material remains in situ and b) fire and smoke do not penetrate the partition.

Allowance should be made for thermal movement of the services in both ambient and fire conditions to ensure loads are not applied to the partition. Some examples of service penetrations include electrical cables, conduits or wires, switches and power outlets, plastic and metal pipes, air-conditioning and ventilation ductwork.

#### 7. Fire Doors & Glazing

Tested or assessed door and/or glazed assemblies should always be used. All and any doors or glazed elements with a fire resistant wall should be shown, by fully compliant testing to the appropriate standard, to be capable of providing at least an equal fire performance to the wall itself. This means fire doors should be tested in lightweight partition systems, not just in masonry. In most cases additional framework will be required to prevent loads being applied to the partition. Careful detailing is needed around the perimeter of any door or glazed assembly.

#### 8. Partition Junction

Care must be taken to ensure that partition corner junctions and intersections are stable for both fire and ambient conditions. Framing at these locations has to be mechanically fastened together.

### Steel Frame Components

#### Board Fixing

Promat boards may be installed horizontally or vertically.

For steel stud partition system, joints in the boards must be staggered between either side of the framing with all the joints located at a framing member. The boards may be fixed to the studs using No.8 Bugle head self drilling and self-tapping screws of a length appropriate for the board thickness. Needle point screws are normally used to fix boards to light gauge steel frames up to 0.8mm. Drill point screws are generally appropriate for heavy gauge steel frames from 0.8mm to 2.0mm.

For solid partition system, joints between the adjacent boards must be staggered by at least 300mm. First layer of the boards are to be fixed to the perimeter angle with 35mm long x No.8 self-drilling and self-tapping screws. The subsequent layer of the boards is to be stitched to the preceding layer with 40mm long x No.10 laminating screws, as well as fixing to the perimeter framing.

When a timber frame is used, Promat boards are fixed to the framework using No. 6 wood screws of a length appropriate for the board thickness at maximum 250mm centres, a minimum of 12mm from the board edge. Minimum edge distance to fasteners and the maximum spacing between screw must be maintained. Please refer to system detail for screws spacing requirements.

Internal and external corners may be set using a perforated metal corner bead fixed to the board linings at not more than 500mm centres.

#### Components Selection

Construction of Promat fire rated steel stud partitions can be achieved using Rondo stud and track components. Other steel components of equivalent performance can of course be used but it is the responsibility of the manufacturer of the component to substantiate equivalent performance with the recommended component.

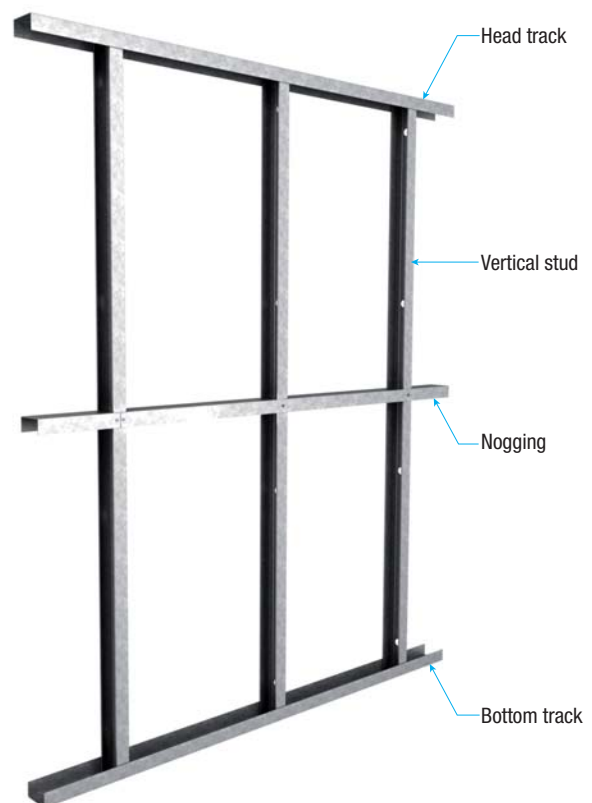
#### Tracks At Deflection Head & Floor

The main function of the ceiling and floor tracks is to hold the studs in position until the board is fitted. They provide for a friction fit of the studs and also act as a slip joint to allow for any movement in the structure.

The track sections basically come in two profiles. A standard track has a nominal 32mm flange whilst the deflection head track has a nominal 50mm flange. However, head tracks with wider flange are available but they have to be specially designed for instances where clearance for expansion at the head track exceeds 20mm.

No clearance for expansion is applicable at the head track for a loadbearing partition.

Track sections should be fixed at maximum 600mm intervals to the supporting structure. Fixings should be located not more than 100mm from either end of the track section.



### Acoustics In Building

Sound is an energy generated by a source, transmitted through a medium and collected by a receiver. It can be pleasant to be heard, such as music and speeches etc, while some, such as scratching a glass surface with a sharp object, are irritating. This offensive sound is commonly termed noise. The acoustic design of buildings can be divided into two basic requirements, noise control and room acoustics.

Noise control relates to the quantity of sound with an objective to ensure the sound level does not adversely affect the comfort of building occupants. This involves control of sound produced in a room, such as telephones ringing, as well as limiting the noise entering from other rooms or outside the building. A common solution targeting this problem is the introduction of sound absorption systems.

Room acoustics relate to the quality of sound with an objective to enhance the quality of desired sound within a room. This involves factors such as speech intelligibility and perception of musical clarity. The most widely applied solution employed by building designers is the use of a sound insulating system.

A point worth noting is that although both noise control and room acoustics have independent objectives, they are however inter-related in practice. As this manual covers partition and ceiling systems, the following concentrates only on issues related to sound insulation which involves transmission loss (TL) of airborne sound.

### Sound Transmission & Classification

The sound transmission loss of a building element, such as a partition, is a measure of how much sound is reduced as it passes through the barrier, expressed in dB or decibels, the unit used to quantify sound. The generally accepted term for the single number ratings for sound transmission loss is the Sound Transmission Class or STC (ASTM E413). This is determined by comparing the TL value to the reference curve in ASTM E413. Generally the higher the STC value, the better the performance of the system. The following table provide a rough idea of what various STC levels mean in terms of privacy afforded.

STC	Privacy afforded
25	Normal speech easily understood
30	Normal speech audible, but unintelligible
35	Loud speech understood
40	Loud speech audible, but unintelligible
45	Loud speech barely audible
50	Shouting barely audible
55	Shouting not audible

Source: U.S. Dept of Commerce/National Bureau of Standards Handbook. "Quieting: A Practical Guide to Noise Control".

Another widely accepted equivalent term is the Weighted Sound Reduction Index or  $R_w$  (ISO 717: Part 1 or BS 5821: Part 1). It is determined in a similar manner but instead of TL values, an equivalent Sound Reduction Index ( $R$  or  $R_w$ ), is used.

Note should be taken that results obtained in STC and  $R_w$  may have a  $\pm 3$ dB deviation from one another.

Most building structures are not built like laboratories and it is very common that the sound insulation rating measured in ideal test conditions will not be achieved in a building. In order to meet the desired level of performance, building designers should therefore carefully consider the compatibility of the selected system with the supporting structure. Note that field performance is typically lower than laboratory performance by approximately 10%.

### General Design Considerations

With modern design concepts and technology in building construction, acoustic performance within buildings has become an important element for consideration by building designers. There are many factors involved in establishing an ideal noise level for any particular building space, part of which are as follows:

- To avoid fatigue induced by noise;
- To prevent distraction or disturbance;
- To maintain a good communication & listening environment.

Heavy walls such as concrete have good transmission loss. However, there are some drawbacks which limit its performance. Mass law dictates that a wall will increase its transmission loss by only 5dB for every doubling of mass. Therefore, a single 100mm thick concrete wall of  $2300\text{kg/m}^3$  density might have an STC 45 rating whereas a 200mm thick concrete wall would only achieve STC 50 for a doubling in mass. For most owners and builders, a wall of this size and weight is not desirable. Cost may more than double and the decibel-per-dollar achieved is clearly not acceptable. This limitation can be easily overcome by using a lightweight system, i.e. the partition system, where it is more practical to utilise principals such as air cavity, resilient mountings, sound-absorbing core materials or a combination of these principals without the large increase in mass required for solid walls.

Following are some common practices that are effective for noise control and room acoustics.

#### 1. Double-studding & Air Cavity

With typical drywall partitions, sound striking at the wall surface is transmitted through the first surface material into the wall cavity. It then strikes the opposite wall surface, causing it to vibrate and transmit the sound into the air of the adjoining room. This is termed airborne sound. When the sound strikes the wall at the stud, sound is transmitted direct through the stud and is termed structure borne sound.

The principal of double studding basically means separation of two panels of a drywall partition into a double-leaf wall, integrated with appropriate air spacing (cavity) between the leaves. The introduction of an air-space provides some form of separation or discontinuity between the two wall faces in a double-leaves wall.



As an example, a double stud partition creating an air cavity eliminates direct mechanical connection between the surfaces. The sound transmission is reduced by breaking the sound path. In addition, the air cavity provides vibration isolation between the two sides. Sound in one room striking the one side of the wall causes it to vibrate but because of the mechanical separation and the cushioning effect of the cavity, the vibration of the other side is greatly reduced.

#### 2. Sound-absorbing Core Material

Sound absorption is the effectiveness of a material at preventing the reflection of sound. Generally, the more sound absorption, the fewer echoes will exist. The sound-absorbing core used in the Promat partition designs can be mineral or rock wool, glass wool or polyester, depending upon fire resistance requirements.

These cores will further improve the sound isolation performance of the wall by absorbing sound energy in the cavity before the sound can set the opposite wall surface in motion. They will also provide some damping of the vibrating wall surface.

### General Design Considerations

#### 3. Treatment To Flanking Paths

When working with acoustically rated systems, it is critical that strict attention be paid to construction and detailing. The acoustic integrity of a system can be influenced by the combination of elements that make up the system. Single leaf and uninsulated systems are especially more dependent on high quality of installation. For example, if there is a gap of 5mm wide around the perimeter of an STC 45 rated wall of 3m x 3m, the actual performance would degrade to some, STC 30. Therefore to make acoustically rated partitions effective, they must be airtight. Any path for air also means there is a path for sound. In order to achieve the designed STC rating closely, the following factors must also be taken into account:

- Sound paths, e.g. windows, doors, floors and ceilings;
- Penetrations through walls, even above ceilings or below floorings, must be sealed;
- Stagger the joints between multiple layers of wall boards or ceiling linings;
- Do not use power points back to back on either side of a wall;
- Openings for return air in ceiling plenum systems must be strictly controlled.

#### 4. Wall & Floor Intersections

A good acoustical partition is only as good as its joint or intersection at wall and floor, like a chain and its weakest link. If this joint or intersection is not treated properly, the acoustical value may be lost. Many joint defects from flanking paths allow sound to travel via air gaps through the structure.

Acoustical sealants are the simplest means to provide a permanent air-tight seal. They are made from materials that are permanently elastic which will allow floor or wall materials to move, as they are prone to do because of expansion and contraction or outside forces such as structural movement. A permanent air-tight seal is the most effective way to maintain the acoustical integrity of the wall. Regardless of which system is employed, all openings, cracks and material joints should be made air-tight with a permanently elastic acoustical sealant.

### System Selection Guide

As sound insulation requirements may vary from country to country, the table below suggests acoustic values for some typical partition installations, unless otherwise specified by the architects. Please consult Promat for more information.

STC rating			Applications for separating
Minimum	Average	Luxury	
45dB	50dB	55dB	Bedroom to bedroom
50dB	55dB	60dB	Bedroom to living room
50dB	55dB	60dB	Bedroom to lobby
45dB	50dB	55dB	Office to office
40dB	45dB	50dB	Office to general area
45dB	50dB	55dB	Office to conference room
45dB	50dB	55dB	Office to washroom
40dB	45dB	50dB	Conference room to general area
40dB	45dB	50dB	Conference room to conference room
45dB	-	-	Classroom to classroom
55dB	-	-	Classroom to shop
45dB	-	-	Classroom to recreation area
60dB	-	-	Classroom to music room



Some sources of sound leakage

- 1** Air leaks through gaps or cracks
- 2** Doors
- 3** Light weight panels above doors
- 4** Electrical outlets and service pipes
- 5** Partition performance
- 6** Sound transmission via suspended ceilings or partitions
- 7** Common floor heating duct
- 8** Common ventilation system without sound absorbents treatment
- 9** Lightweight mullion or partition closer
- 10** Appliances



Fire attack from either side / Non loadbearing



Fire Rating	FRL	-/60/60
	STANDARD	BS476: Part 22: 1987 AS1530: Part 4: 2005
	APPROVAL	BRE CC86480A (for -/60/60)
Acoustic	# STC # R <sup>w</sup>	35dB 35dB
	STANDARD	ISO140: Part 3: 1996 ISO717: Part 1: 1996
	PREDICTED ASSESSMENT	Marshall Day 18th Oct 2006
Construction	MAXIMUM HEIGHT	3000mm
	MAXIMUM LENGTH	Unlimited
	PARTITION THICKNESS	Nominal 36mm
	PARTITION MASS	37.85kg/m <sup>2</sup>

# Margin of error is generally within ±3dB.

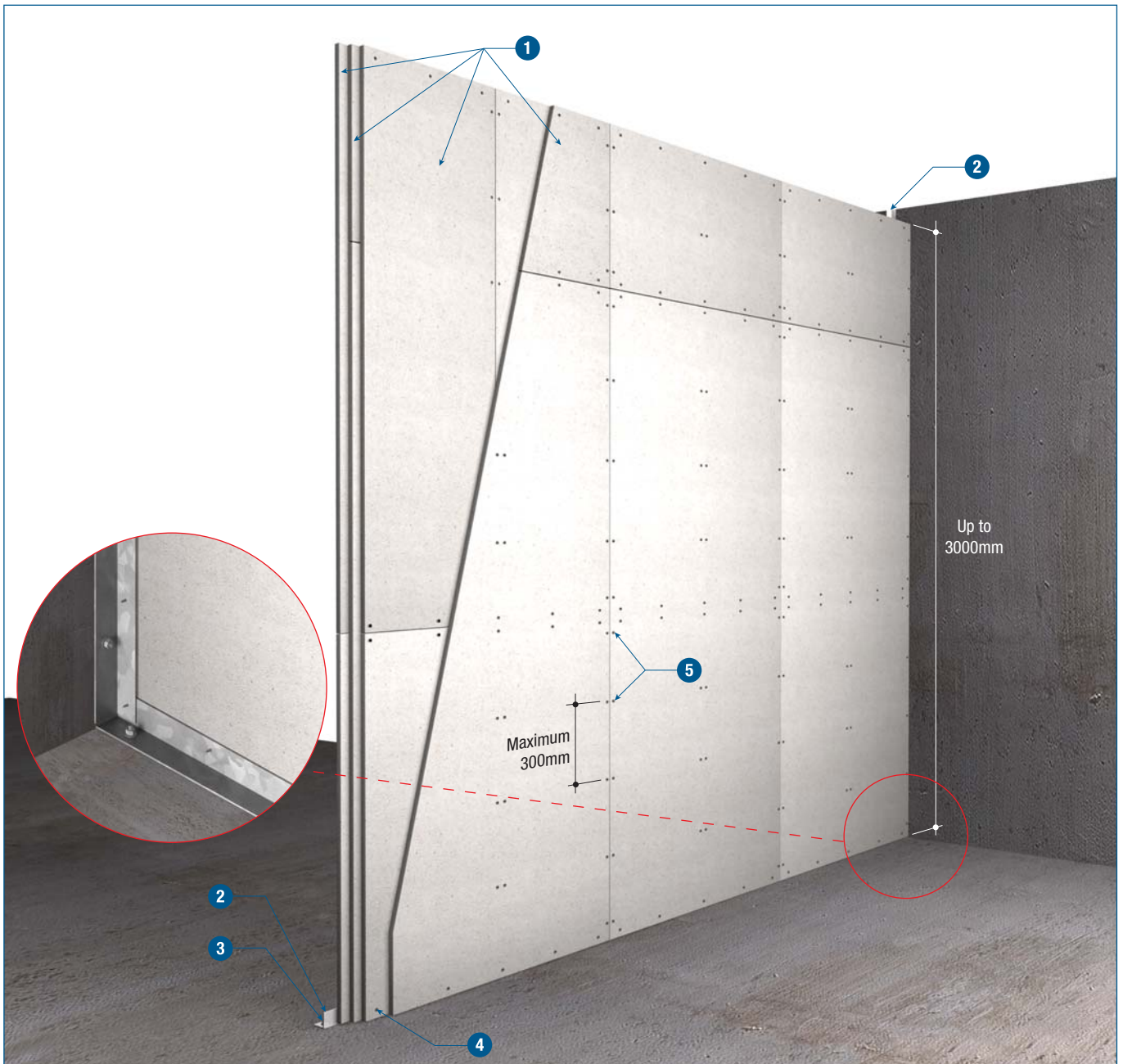
### TECHNICAL DATA

- 1 For FRL of -/60/60  
Minimum 35mm thick PROMATECT®-H board laminated from 4 x 9mm of thicknesses
- 2 Galvanised steel perimeter angle 25mm x 30mm x 0.8mm thick
- 3 40mm x M6 masonry anchors at maximum 500mm centres
- 4 Self-tapping screws, types and fixings in accordance with system specifications.
- 5 Laminating stitching screws, types and fixings around the steel perimeter angle and down the centre of each board in accordance with system specifications.

### System Specification

Walls are to be constructed using 4 layers of PROMATECT®-H matrix engineered mineral boards all in accordance with the Architectural Specification in the manufacturer's handbook. Relevant constructions are to be selected according to the required FRL of (.../.../...). All printed installation details are to be followed to ensure approval to BS476: Part 22 and AS1530: Part 4. All work to be certified by installer in an approved manner.

Non loadbearing



### TECHNICAL DATA

- 1 For FRL of -/60/60  
4 layers of PROMATECT®-H board, 9mm thick each staggered joints by at least 300mm.
- 2 Steel perimeter angle 40mm x 40mm x 1mm thick
- 3 40mm x M6 masonry anchors at nominal 600mm centres
- 4 30mm x No.8 self-tapping screws fixed to steel perimeter angle at 200mm centres

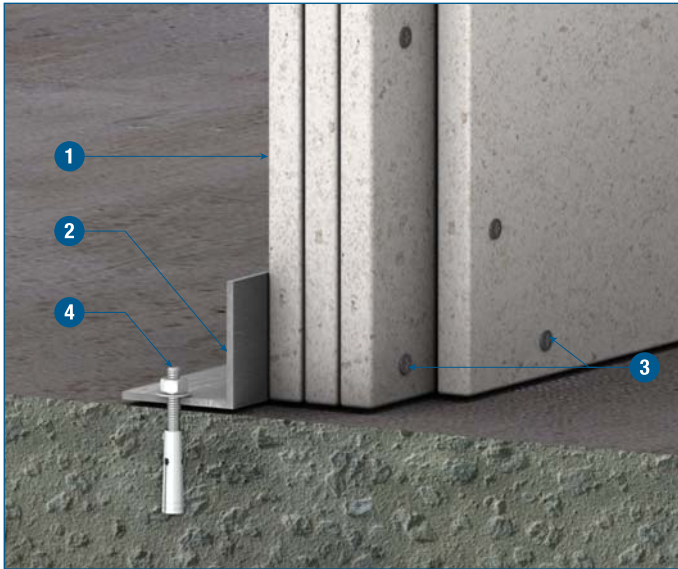
- 5 Laminating stitching screws of appropriate length at maximum 300mm centres

Once 1st layer of board is screwed to the perimeter angles, all subsequent layers are  
 a) fixed to the perimeter angle and;  
 b) stitched to the proceeding layers of boards.

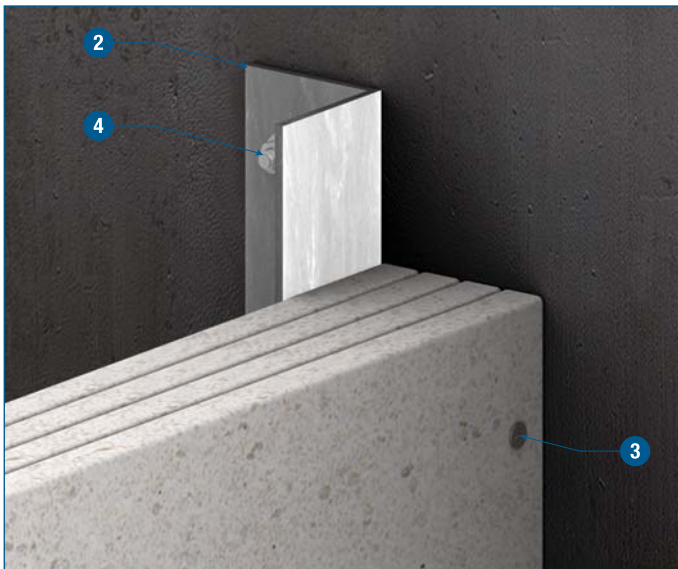
See page 8 for wall connection details.



### Wall base fixing



### Wall junction fixing



### TECHNICAL DATA

Please consult Promat Technical Department for amendments where seismic loads are expected.

- 1 PROMATECT®-H board
- 2 Galvanised steel angle of appropriate size
- 3 No.8 self-tapping screws of appropriate length into the perimeter angle
- 4 40mm x M6 masonry anchors at 600mm centres



### Architectural Specification

The following are standard Architectural Specifications for internal partition systems using PROMATECT®-H. The designer must determine the suitability of the design to the application and requirements before undertaking or constructing any works relating to the specifications and where in doubt should obtain the advice of a suitably qualified engineer.

#### Fire Attack From Either Side / Non Loadbearing

Up to \_\_\_\_\_<sup>(1)</sup> minutes of fire rating, integrity and insulation in accordance with the criteria of **BS476: Part 22: 1987** and **AS1530: Part 4: 2005**.

#### Acoustic Performance

The partition system shall have a Weighted Sound Reduction Index of  $R_w$  \_\_\_\_\_<sup>(2)</sup>.

#### Supporting Structure

Care should be taken that any structural element that the partition system is supported from, e.g. concrete/brick wall, has equivalent fire resistance of \_\_\_\_\_<sup>(3)</sup> minutes.

#### Lining Boards

##### FOR FRL OF -/60/60

One layer of 20mm and one layer of 15mm PROMATECT®-H matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Stagger joints by at least 300mm at the first layer and 200mm on the second layer. Standard board dimensions 1220mm x 2440mm x 15mm or 20mm.

Three layers of 12mm PROMATECT®-H matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Each successive layer of board must be fastened to the previous layers at 300mm centres.

Four layers of 9mm PROMATECT®-H matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Each successive layer of board must be fastened to the previous layers at 300mm centres.

##### FOR FRL OF -/120/120

One layer of 20mm and two layers of 15mm PROMATECT®-H matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Stagger joints by at least 300mm at the first layer and 200mm on the second layer. Standard board dimensions 1220mm x 2440mm x 15mm or 20mm.

Two layers of 25mm PROMATECT®-H matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. Stagger joints by at least 300mm at the first layer and 200mm on the second layer. Standard board dimensions 1220mm x 2440mm x 25mm.

#### Fixing

##### FOR FRL OF -/60/60

Galvanised steel frame made of perimeter steel angle 40mm x 40mm x 1mm thick will be fastened to the wall/floor/ceiling with 40mm x M6 masonry anchors at 500mm centres. First layer 20mm, fixed to perimeter angle using 30mm x No.8 screws at 200mm centres. Second layer 15mm, fixed to first layer using 30mm x No.8 screws at 300mm centres around the perimeter and down the centre of each panel.

Galvanised steel frame made of perimeter steel angle 40mm x 40mm x 1mm thick will be fastened to the wall/floor/ceiling with 40mm x M6 masonry anchors at 600mm centres. First layer, fixed to perimeter angle using 30mm x No.8 screws at 200mm centres. Each successive layer of board must be fastened to the previous layers at 300mm centres.

##### FOR FRL OF -/120/120

Galvanised steel frame made of perimeter steel angle 50mm x 50mm x 1mm thick will be fastened to the wall/floor/ceiling with 40mm x M6 masonry anchors at 500mm centres. First layer 20mm, fixed to perimeter angle using 32mm x No.8 screws at 200mm centres. Second layer 15mm, fixed to first layer using 45mm x No.8 screws at 300mm centres around the perimeter and down the centre of each panel. Third layer of board must be fastened to the previous layers at 300mm centres using 65mm x No.8 screws.

Galvanised steel frame made of perimeter steel angle 50mm x 50mm x 1mm thick will be fastened to the wall/floor/ceiling with 40mm x M6 masonry anchors at 500mm centres. First layer, fixed to perimeter angle using 32mm x No.8 screws at 200mm centres. Second layer fixed to first layer using 65mm x No.8 screws at 300mm centres around the perimeter and down the centre of each panel.

#### Tests & Standards

The complete system along with the material and framing is tested in accordance with BS476: Part 22: 1987. The partition system should meet the requirements as specified under Clause 5.

#### Jointing

Plain butt joints between machined edges of boards.<sup>(4)</sup>

Joints filled in preparation for painting.<sup>(5)</sup>

Joints filled and taped in preparation for decoration.<sup>(6)</sup>

#### Follow-on Trades

Surface of boards to be prepared for painting/plastering/tiling<sup>(7)</sup> in accordance with manufacturer's recommendations.

#### NOTES:

- <sup>(1)</sup> insert required fire rating, integrity and insulation durations.
- <sup>(2)</sup> insert acoustic values by reference to Marshall Day assessment.
- <sup>(3)</sup> insert required fire resistance level (not exceeding 120 minutes).
- <sup>(4), (5), (6), (7)</sup> delete as appropriate.
- Perimeter gaps will be filled with fire resistant PROMASEAL® AN Acrylic Sealant.

For latest information of the Promat Asia Pacific organisation, please refer to [www.promat-ap.com](http://www.promat-ap.com)

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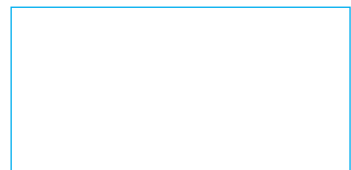
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