PRÎMA™
FIBRE CEMENT BUILDING SOLUTIONS

Technical Manual

PRÎMA *solidwall*

Hume Cemboard Industries
A Member of the Hong Leong Group

1. Introduction

PRIMA*solidwall* is a non-load bearing lightweight concrete wall system comprising of fibre cement boards fixed onto galvanized steel stud frames and core filled with lightweight concrete mix. It is designed to replace the conventional and outmoded brick wall system, PRIMA*solidwall* complies with the local and international fire rating, sound & thermal insulations as well as wall robustness standards.

PRIMA*solidwall* is an industrial building system (IBS) certified which also contributes to the Green Building Index (GBI) ratings. PRIMA*solidwall* features a seamless joint straight wall that meets the CONQUAS and QLASSIC requirements, combined with speed of construction, durability and excellent finishing.

2. Application & Scope

PRIMA*solidwall* (76mm or 104mm) is the perfect solution for interior walls acting as the separation wall in both residential and commercial developments. For exterior facing walls such as perimeter wall, PRIMA*solidwall* 104mm is much suited for this application. The walls height must be referred to the Stud's Manufacturers' recommendation because different wall height requires a different frame stud thickness.

3. System Index

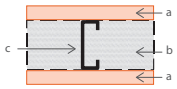
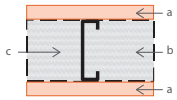
System Configuration	System ID	System Components	Wall Thickness	Wall Mass	Sound Transmission Class (STC)	Fire Rating (BS476, Part 22)	Thermal Properties	Usage Area
PRIMA*solidwall* 76mm 	SW76 L6	a) PRIMA*liner*™ board: 6x1220x2440mm b) Lightweight concrete mix (cement + sand + expanded polystyrene beads) c) PRIMA*wall stud* 64mm x 0.55mm BMT (min)	76mm	76 kg/m²	39 dB	2 hrs	R value: 0.238 m²K/W	Internal Walls only
PRIMA*solidwall* 104mm 	SW104 L6	a) PRIMA*liner*™ board: 6x1220x2440mm b) Lightweight concrete mix (cement + sand + expanded polystyrene beads) c) PRIMA*wall stud* 92mm x 0.55mm BMT (min)	104mm	100 kg/m²	44 dB	3 hrs	R value: 0.317 m²K/W	External & Internal Walls

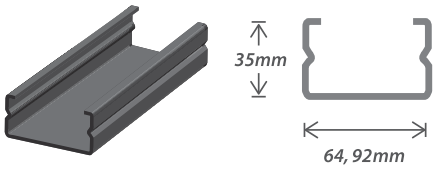
Table 1: PRIMA*solidwall* *Fire Rated, Acoustic Properties & Application Area.*

4. Design Guideline

4.1 Components

4.1.1 PRIMA*liner*™ 6.0mm
For interior and exterior application, use PRIMA*liner*™ 1220mm x 2440mm x 6.0mm (standard size).

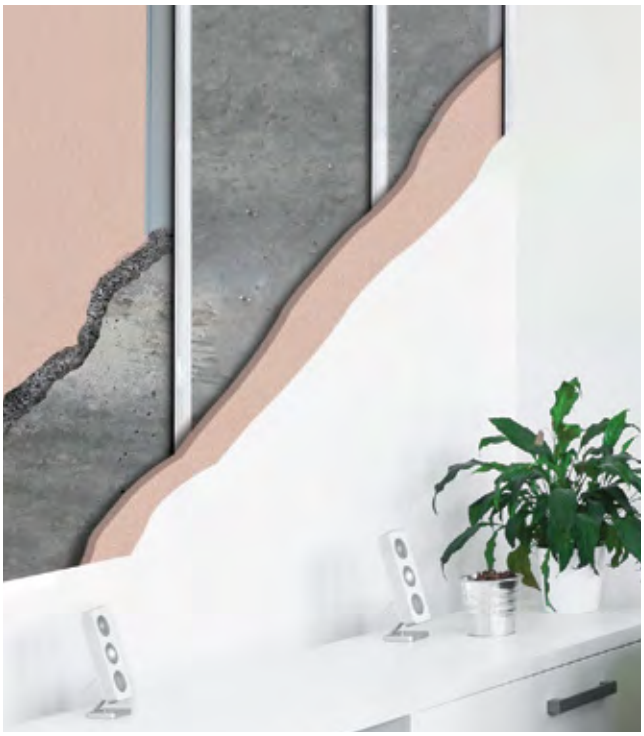
4.1.2 PRIMA*wall stud* - C
Designated rolled steel section for supporting vertical structure of frame. It is manufactured from GI steel or Zincalume finishing of minimum 0.55mm base metal thickness (BMT).



PRIMA*wall stud* - C

PRIMA*wall stud* - C	System
1) 64mm x 35mm	PRIMA*solidwall* 76mm
2) 92mm x 35mm	PRIMA*solidwall* 104mm

Table 2: PRIMA*wall stud* - C *for* PRIMA*solidwall*

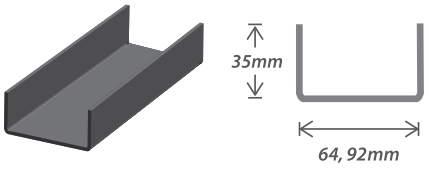


4.1.3 PRIMA *wall stud* - U

Designated rolled steel section for supporting horizontal; bottom and top of frame. It is manufactured from GI steel or Zincalume finishing of minimum 0.55mm base metal thickness (BMT).

PRIMA *wall stud* - U	System
1) 64mm x 35mm	PRIMA *solidwall* 76mm
2) 92mm x 35mm	PRIMA *solidwall* 104mm

Table 3: PRIMA *wall stud* - U *for* PRIMA *solidwall*



PRIMA *wall stud* - C

4.1.4 Fasteners

PRIMA *fastener* - Wafer Head 13mm and PRIMA *fastener* - Wing Tek 22cm are used as the fasteners for PRIMA *solidwall* system. Fasteners should have a minimum Class 1 finish. Class 3 finish is recommended to be used for external application. The table below shows the recommended PRIMA *fastener* to be used to construct the PRIMA *solidwall* system.

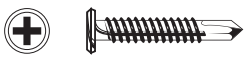
Fastener Type	Fastener Photo	Usage Area
PRIMA *fastener* - Wing Tek 22mm C1		PRIMA *liner*™ 6.0mm to metal stud (internal)
PRIMA *fastener* - Wing Tek 22mm C3		PRIMA *liner*™ 6.0mm to metal stud (external)
PRIMA *fastener* - Wafer Head 13mm C1		Metal Stud to metal stud, steel door or window frame to metal stud.

Table 4: Fasteners for PRIMA *solidwall*

Attaching Wall Tracks to Structure

Power Actuated | Expansion Pin | Expansion Bolt

Figure 1: Fastening System for steel stud to masonry wall / slab.

4.1.5 Joint Compound For Fasteners Covering

Use only PRIMA *jointing compound* with 10% cement mixing ratio to conceal the fasteners head for aesthetic appearance. The jointing compound must be applied according to the PRIMA *jointing compound* , Technical Data Sheet (TDS).

4.1.6 Flush Joint Compound

Use only PRIMA *jointing compound* with 10% cement mixing ratio to conceal the board jointing recessed area to provide a flat surface and seamless joint for coating. The jointing compound must be applied according to the PRIMA *jointing compound* Technical Data Sheet (TDS).

4.1.7 Fibre Mesh Tape

PRIMA *fibre mesh tape* must be used as the reinforcement tape at boards' jointing areas.

4.2. Wall Installation

4.2.1 Steel Stud Framing

4.2.1.1 Panel Stud Installation:

a. Ensure floor is reasonably flat and level. Set the wall position as indicated in the construction drawings.

b. Top (ceiling), bottom (floor) and masonry wall tracks are to be anchored to the floor slab at maximum spacing of maximum 610mm centers. Refer to Figure 2 for guideline for stud framing installation sequence.

c. PRIMA *wall stud* - C is then slot in vertically to the stud spacing of 305mm center. Figure 3 for frame & board installation layout.

d. Once all the PRIMA *wall stud* - C is well aligned, tighten it with PRIMA *fastener* - Wafer Head 13mm C1 to PRIMA *wall stud* - U (top and bottom).

e. Check steel frame straightness. For best result, straightness should be within 3mm over 3000mm length in any direction.

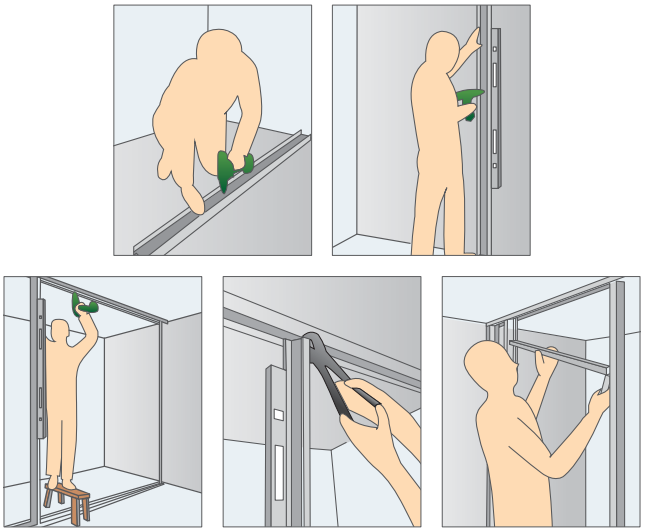


Figure 2: Guideline for Stud Framing Installation Sequence.

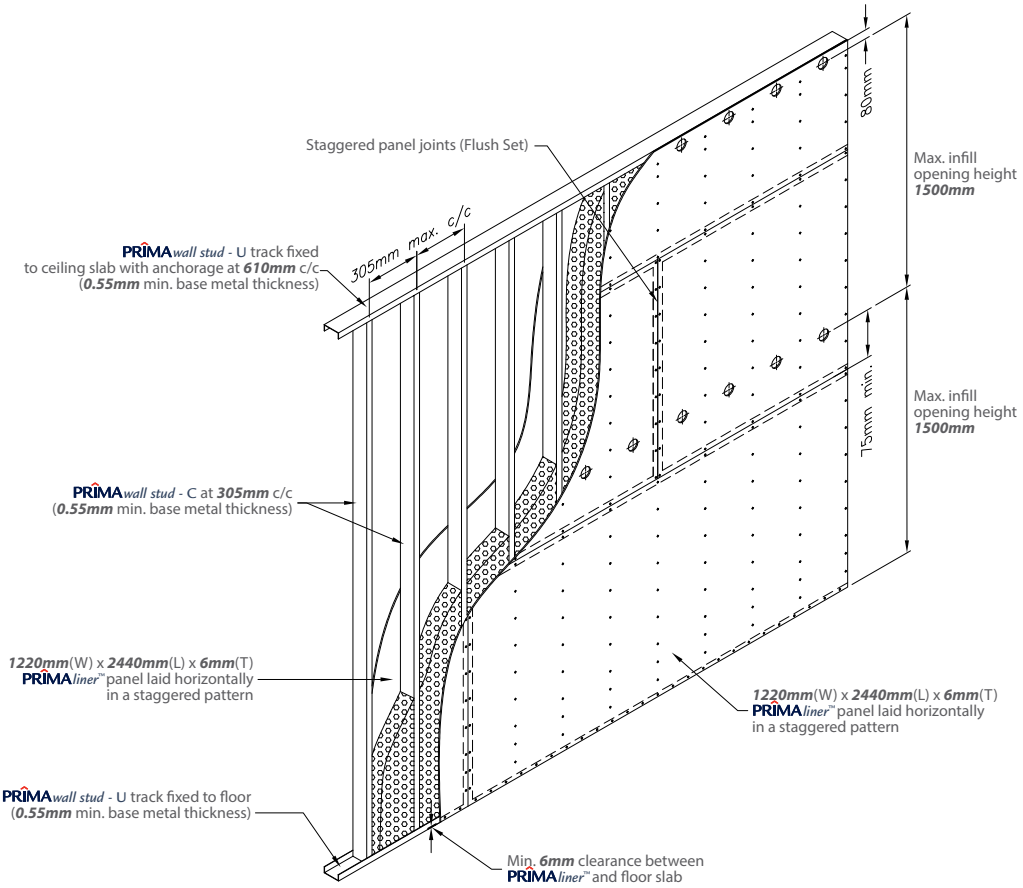


Figure 3: Frame & board installation layout

4.2.1.2 Door Stud & Frame Installation:

a. Use PRIMA *wall stud* - U for horizontal (top) and PRIMA *wall stud* - C for vertical (left & right) door stud frame.

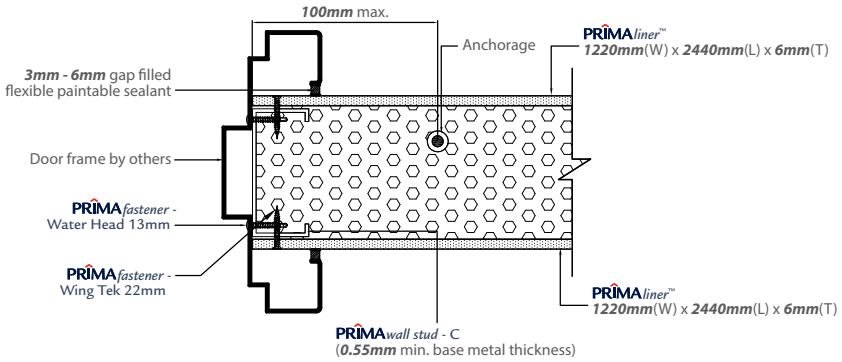
b. Attach the door frame where the door frame depth is divided equally between the wall thicknesses. Contractors are recommended to use drywall door frame depth (wall thickness +20mm). Refer to Figure 4 for typical door frame installation details for steel and wood door frame.

c. Fasten with PRIMA *fastener* - Wafer Head 13mm C1 of door frame to stud (bottom, center and top of the door frame, both left and right).

d. Ensure the door stud frame is leveled before fasteners are tightened.

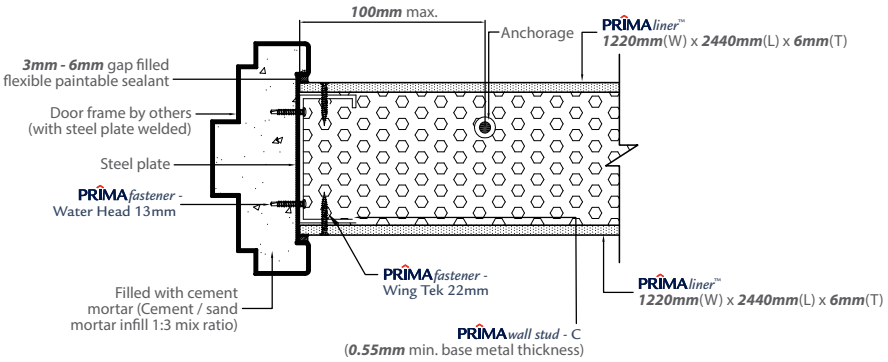
e. Cover the door frame gap with flexible paintable sealant.

f. Other door frame also can be used but must install as per Door Frame manufacturer's recommendation.



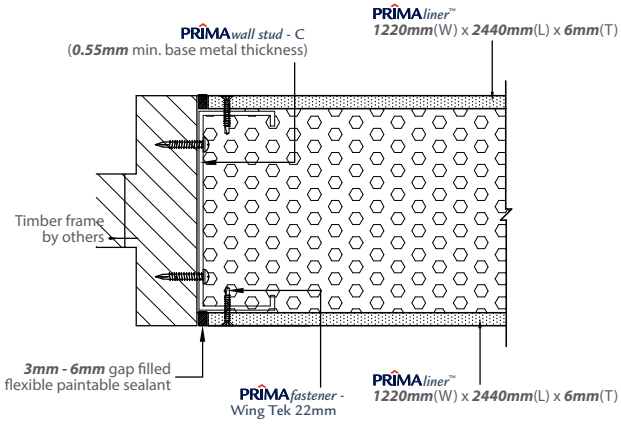
OPTION 1: DOOR JAMB DETAIL (STEEL DOOR FRAME)

Figure 4a: Typical Steel Door Frame Installation Details



OPTION 2: DOOR JAMB DETAIL (STEEL DOOR FRAME)

Figure 4b: Typical Steel Door Frame (with welded steel plate) Installation Details



OPTION 3 : DOOR JAMB DETAIL – TIMBER DOOR FRAME

Figure 4c: Typical Timber Door Frame Installation Details

4.2.1.3 Window Stud and Frame Installation:

a. Use PRIMA *wall stud* - U for horizontal (top & bottom) and PRIMA *wall stud* - C for vertical (left & right) window stud frame. Refer to Figure 5 for typical window frame installation details.

b. Install window frame as indicated in the construction drawing specified by the respective manufacturer (if any).

c. Cover the window frame gap with flexible paintable sealant.

d. Ensure the window stud frame is leveled before fasteners are tightened.

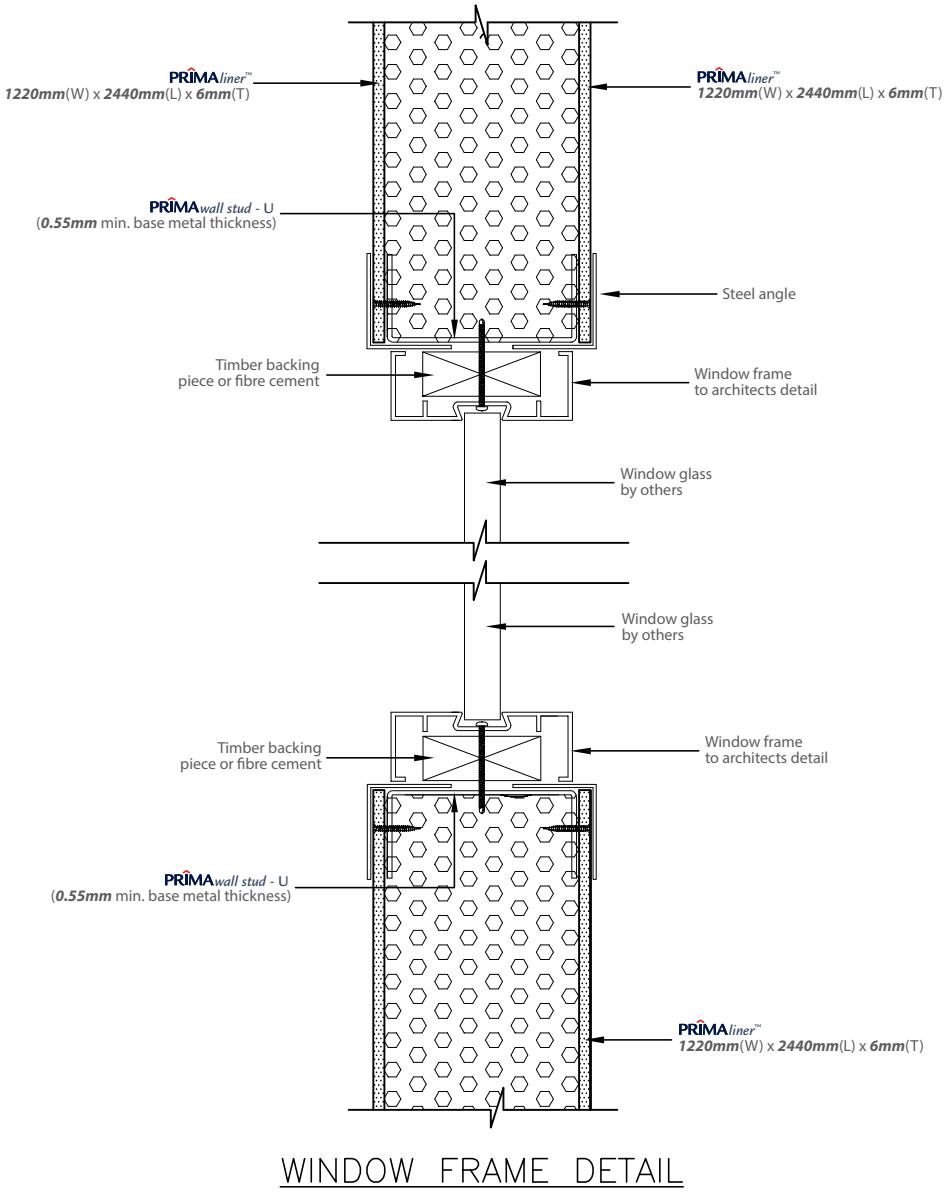


Figure 5: Typical Window Frame Installation Details

4.2.2 Board Installation

PRIMA liner™ must be kept dry before installation. If board becomes wet after installation, allow it to dry before solid infill pumping.

4.2.2.1 PRIMA liner™ Installation:

a. Install PRIMA liner™ boards in horizontal orientation and in staggered pattern across one side of the wall studs. Start from floor (bottom) to ceiling (top). A 6mm gap should be raised from floor using off cut packers as temporary support for sheet.

b. Refer to Figure 6 for board's pattern orientation and fasteners distances installation.

c. Install the stud for door or window prior to board installation as 4.2.1.2 and 4.2.1.3. Make C shape or L shape boards section to avoid cracks at the joint between the boards and the door or window edges. Ensure that the sheet edges do not coincide with the side of the door or window opening. Refer to Figure 7 for sheet layout with door and window opening.

d. Install the vertical flush joints in zigzag pattern. Vertical flush joints at both partition sides shall not connected at one point in the same stud frame. Refer to Figure 8 for vertical flush joints in zigzag system between front and back wall sides.

e. Create infill openings of 60mm diameter for every column (between studs) at recommended maximum wall height of 1500mm for each interval. Refer to Figure 3.

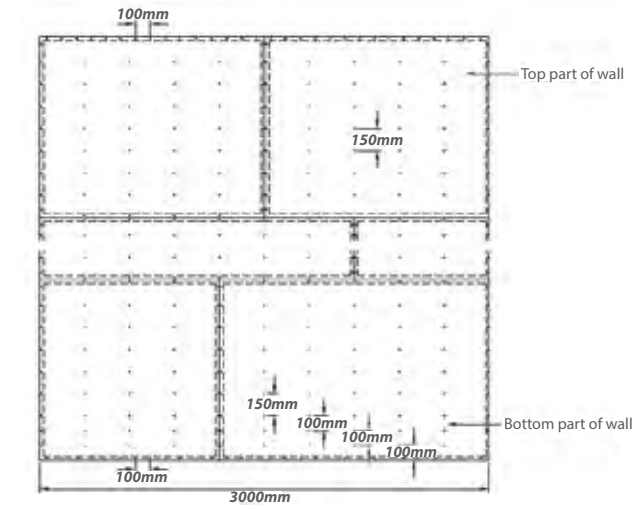


Figure 6: Board's Pattern Orientation and Fasteners Distances.

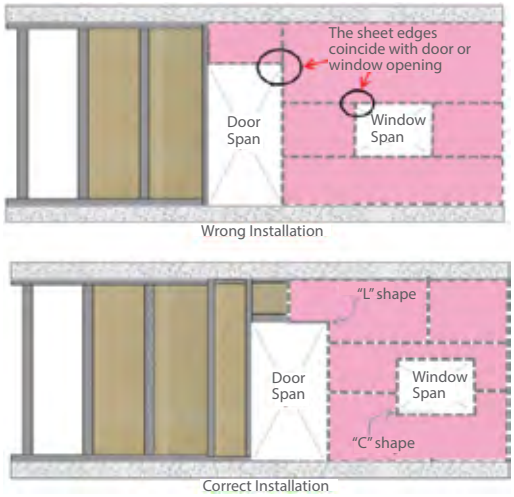


Figure 7: Sheet Layout with Door and Window Opening

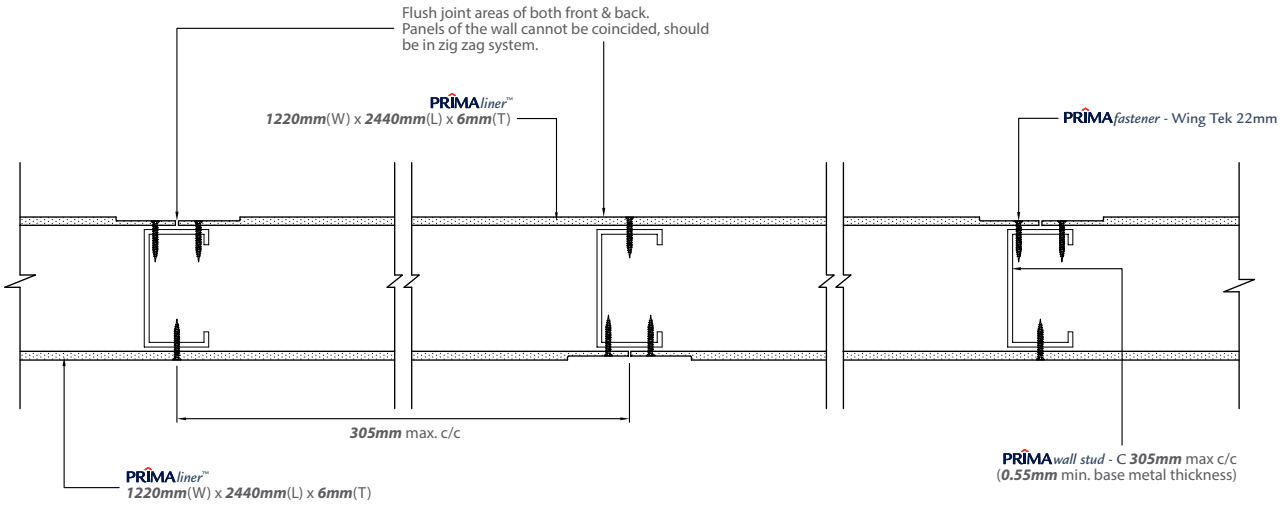


Figure 9: Concrete wall intersection to solid infill wall

4.2.2.2 Wall Intersection To Solid Infill Wall

a. For solid infill wall intersection either masonry wall to solid infill wall or solid infill wall to solid infill wall, a 3 – 6mm gap filled with flexible paintable sealant is required.

b. Refer to Figure 9 for concrete wall intersection to solid infill wall.

c. Refer to Figure 10 for corner wall intersection of solid infill wall to solid infill wall. Only inward corner required a 3 – 6mm gap filled with flexible paintable sealant.

d. Refer to Figure 11 for solid infill wall to solid infill wall intersection at the center.

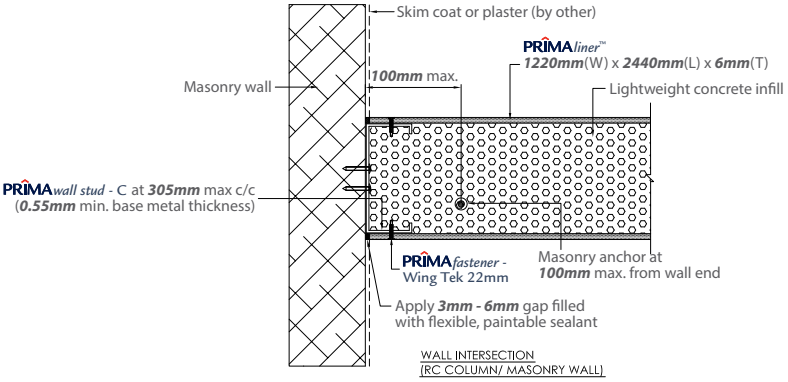


Figure 9: Concrete wall intersection to solid infill wall

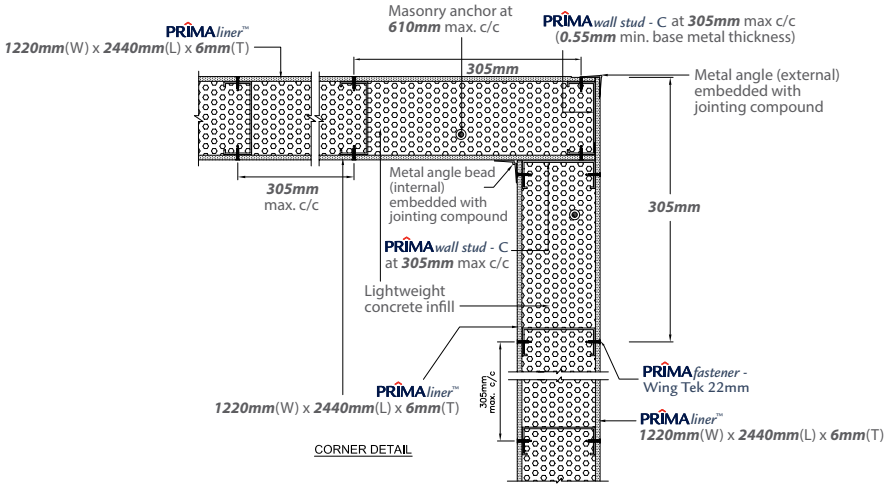


Figure 10: Corner wall intersection of solid infill wall to solid infill wall

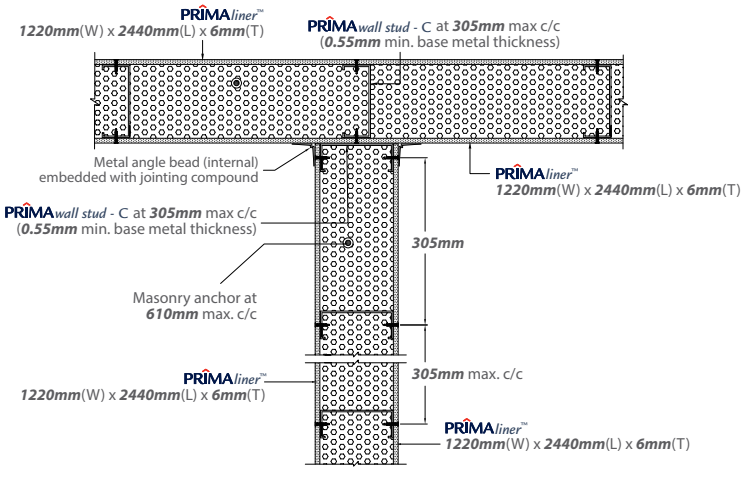


Figure 11: Solid infill wall to solid infill wall intersection

4.2.2.3 M&E Installation

a. M&E services installation is recommended to be done prior the 2nd piece wall panel installation.

b. Electrical socket can be reinforced with either light gauge steel batten or L-angle. Refer to Figure 12 for electrical outlet in between section C-C using light gauge steel batten and electrical outlet attached to stud using L-angle.

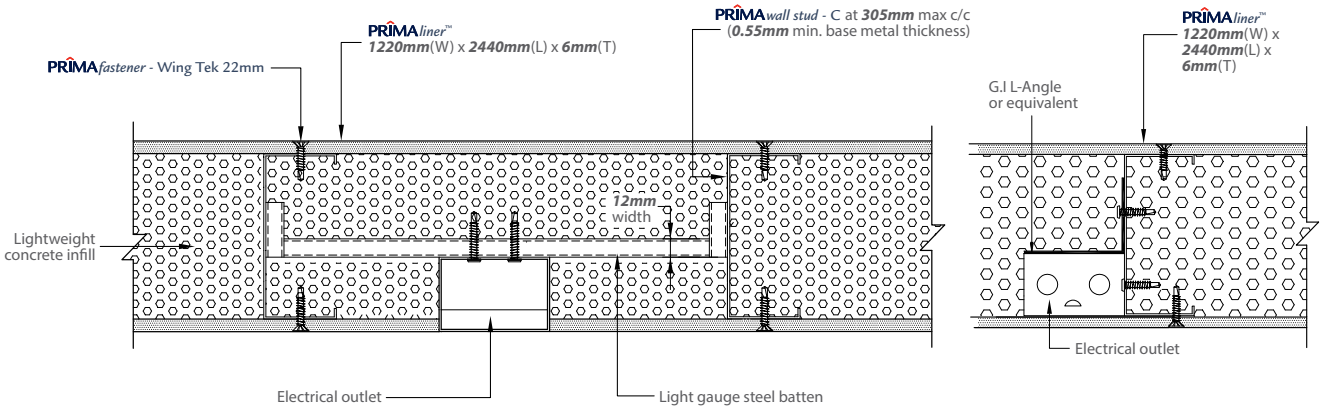


Figure 12: Electrical outlet in between section C-C and electrical outlet attached to stud

4.2.2.4 Solid Infill Materials and Pumping Process

4.2.2.4.1 Recommended Mixture

Light weight concrete is mixed in the proportions of: Cement (by weight): Sand (by weight): EPS (by volume) = **50kg: 100kg: 150Liter**

4.2.2.4.2 Mixing & Infilling Methodology

a. Make sure the 3-phase power is ready then switch on the mortar pump machine.

b. Pour the 150Liters EPS beads in to the mixer tank follow by 100kg of sand (equivalent to 13 sand shovels, 1 bag of cement (50kg) and 100gm additives (HY additive). Gradually add in approximately 30Liters of water.

c. Allow the material to be mixed evenly in about 2 - 3 minutes. Inspect the mix to ensure its workability. Then discharge the mixture in to the storage tank through the filtration screen.

d. Switch on the main pump machine and the mixture will automatically pump to the higher level through the iron tube and flexible tube with nozzle.

e. Insert the nozzle in to the infill opening and start filling up all cavities at 305mm interval.

f. Clean the excessive infill out of the infill opening and waste on the floor properly, allow the light weight concrete to cure for at least 4 hours before infilling the next level of light weight concrete.

g. Allow 7 days curing before the next process such as flush jointing or painting.

h. Hollowness in the wall cavity can be identified by visual observation, PRIMA liner™ would change its colour to darker pink (wet appearance) in the following day after infilling. If the PRIMA liner™ colour remain unchanged (dry look), then the cavity may subject to hollowness. Inspect/ check for hollowness. Hollowness can be repaired by creating additional opening at the affected area and filling the cavity manually using the light weight concrete mix.

4.2.2.5 Flush Jointing (At Board Jointing Areas & Fasteners)

a. Use damp sponge to clean the board jointing surface and ensure the board surface is free from dust.

b. Embed the PRIMA *fibre mesh tape* followed up by 1st layer of PRIMA *jointing compound* (approximately 100 mm wide) using 100 mm scrappers. The 1st layer compound may take 2hrs to dry.

c. Apply 2nd layer of PRIMA *jointing compound* (approximately 150 mm wide) using 150 mm scrapers once the 1st layer of compound dry, indicated by lighter colour appearance.

d. For fastener points, apply two layers of PRIMA *jointing compound.*

e. Ensure the fastener points are smooth.

f. When dry, lightly scrap away the uneven surface of the flush joint areas & fasteners using scrapper to get an even finish before any finishing.

g. Refer to Figure 14 for flush joint detail, Figure 15 for outward flush joint corner and Figure 16 for inward flush joint corner.

h. For inward joint corner, can either use sealant or flush jointing to seal the gap.

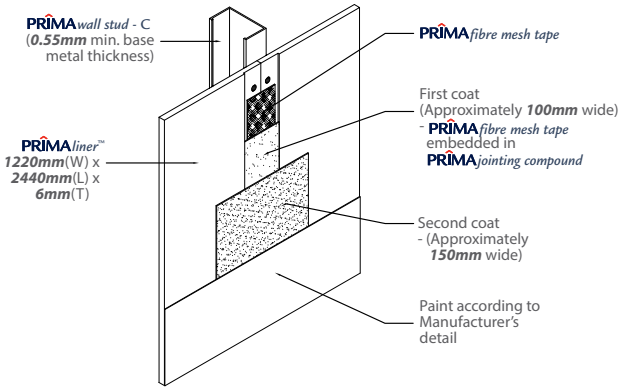


Figure 14: Flush joint detail

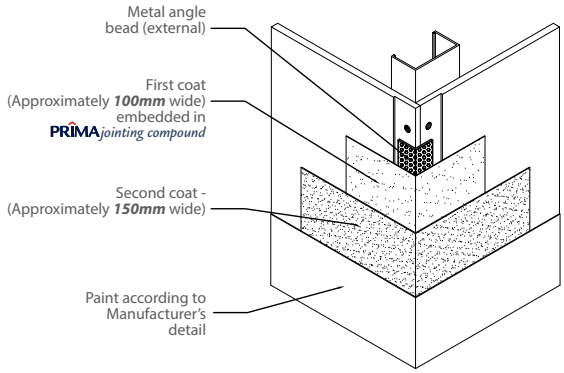


Figure 15: Outward flush joint corner

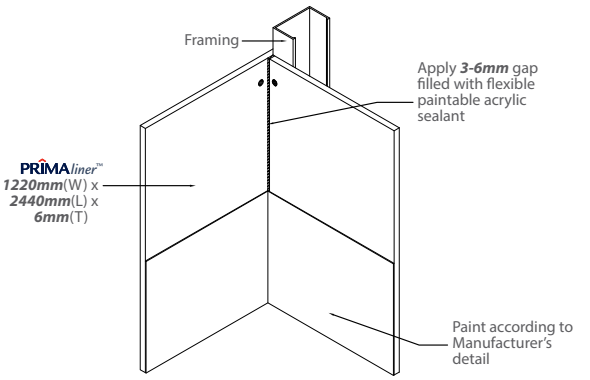


Figure 16a: Inward flush joint corner using flexible sealant

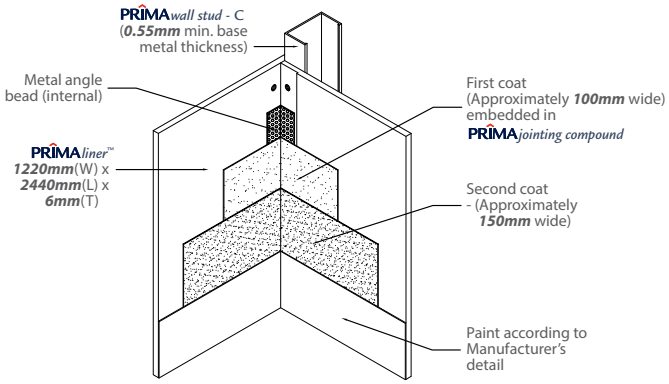


Figure 16b: Inward flush joint corner using metal angle.

4.3 Control Joints

Control Joints in PRIMA *solidwall* system are required to correspond to thermal expansion between wall system with supporting structure or anywhere that significant structural movement is expected.

4.3.1 Vertical Control Joints

Vertical control joints must be provided to accommodate anticipated movement within a building. PRIMA *solidwall* systems require vertical control joints to be located as follow;

Recommended Control Joints Spacing	
Untilled walls	9.0m
Tiled walls	4.8m

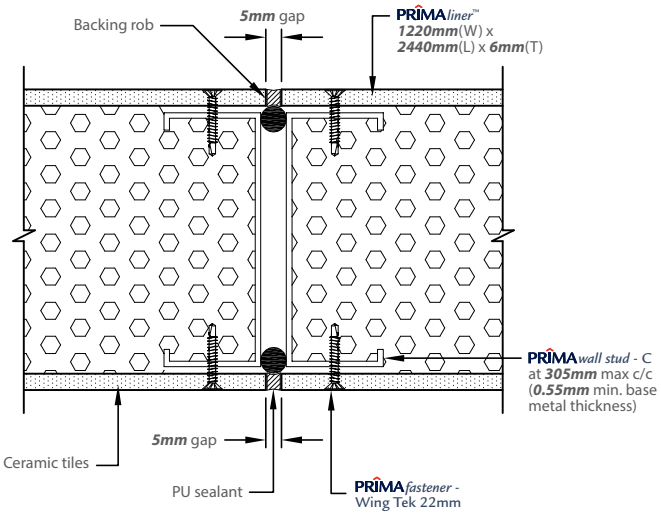


Figure 17: Vertical Control Joints

4.3.2 Horizontal Control Joints

It is required beneath slab or beam or primary structure to accommodate any expected deflection. The magnitude of the deflection must be verified by the Structural Engineer.

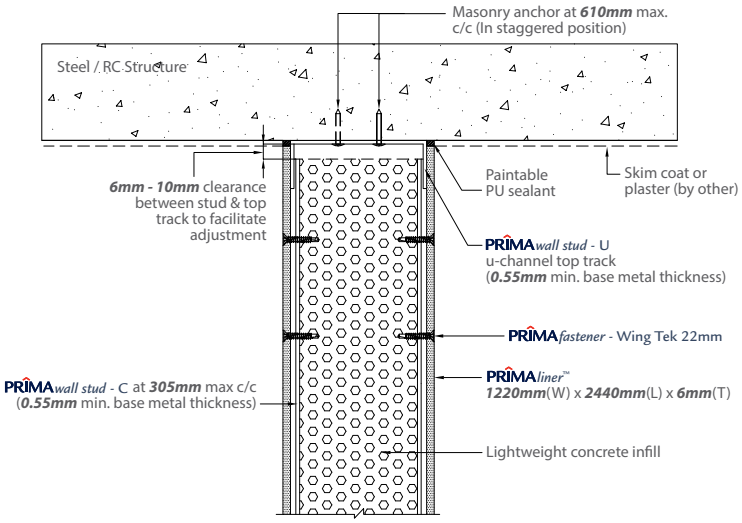


Figure 18: Horizontal Control Joints (beneath slab / beam)

4.4 Panel Finishes

PRIMA *solidwall* system has a slightly pink finish on both surfaces. Under normal circumstances PRIMA *liner*™ board must be top-coated within 3 months after installation. Ensure boards are dry prior to painting. In all cases, Coating Manufacturer's recommendations must be strictly adhered to.

4.4.1 Interior Finishes

The interior surface can be decorated with 2 coats of 100% quality water-based acrylic paint. There is no requirement for primers or sealers for general purpose application. Alternatively the interior surface can be also decorated with wall covering materials such as wall paper.

4.4.2 Exterior Finishes

The exterior surface must be coated with an appropriate finish. The exterior surface of PRIMA *solidwall* can be finished with any variety of coatings, provided they are compatible with fibre cement, PRIMA *fastener* and PRIMA *jointing compound*. A layer of exterior sealer and 2 layers of exterior paint are preferred.

5. Design Considerations

This guide represents good practice, though it is not intended as an exhaustive statement of all relevant information. It remains the responsibility of the Building Designer to verify that the PRIMA *solidwall* system is suitable for the particular requirements of any given project.

WARRANTY

Hume Cemboard Industries Sdn Bhd ("the Company") warrants that it will at all times ensure that the products referred to herein ("the Products") shall be supplied by it to the purchaser free of any manufacturing defects and defective materials used in their manufacture.

In the event and if contrary to this assertion the Products prove to be defective, whether as a result of manufacturing defects or arising from the Company's use of defective materials, the Company will supply replacement Products. The Company shall, however, have the option and may choose to reimburse the purchaser the purchase price of the Products instead. The Company shall not be liable for any economic or consequential losses arising from any use of defective Products.

This warranty shall be void unless the purchaser has, in its handling and installation of the Products, complied with the recommendations contained in this brochure and other good building practices expected of a reasonable purchaser.

ADVISORY NOTE

Successful installations of Hume Cemboard Industries Sdn Bhd's Products depend on a large number of factors that are outside of the scope of this brochure. Particular design, detail, construction requirements and workmanship are beyond the control of the Company. As such, Hume Cemboard Industries Sdn Bhd's warranty does not extend to non-usability of Products or damage to Products arising from poor or defective designs or systems or poor quality of workmanship in the installation of Products.

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