Supercrete™

Sustainable Cost Effective Construction & Coating Systems

Commercial & Industrial Wall Systems

Design & Installation Guide

Supercoat™

100% NZ
Owned & Operated

Commercial and Industrial Wall Systems Design and Installation guide

This Design and Installation Guide is for **non load bearing** horizontal and vertical wall panel systems, used as cladding on commercial and industrial structures. The design of a wall system for a building requires the services of a professional consultant and this guide has been prepared for their assistance but in no way replaces the services of a professional consultant on the project.

Contents

1.0 Introduction

1.1 What are Supercrete™ Commercial and Industrial Wall Panels?

The Supercrete™ Commercial and Industrial Wall Panel Systems (CIWS) use precast reinforced autoclaved aerated concrete (AAC) panels for construction of walls, where load bearing is not required. Vertical wall panels can be used as load bearing walls but this design guide only covers non load bearing applications. The panels are a very fast way of cladding a structure with the inherent beneficial thermal, fire and soundproofing properties of AAC. They are an ideal complement to steel frame construction in commercial applications, and panels are manufactured in varying thicknesses and lengths for specific projects.

Autoclaved Aerated Concrete is manufactured from sand, lime and cement, to which a gas forming agent, in the form of aluminum paste is added. The liberated gas expands the mixture, forming small finely dispersed air bubbles, resulting in a lightweight concrete approximately one quarter of the weight of traditional concrete. Typical panel dimensions are shown in fig. 1.1

1.2 Development and availability

Superbuild International Ltd is the sole supplier of Supercrete™ Wall Panels into New Zealand, and have a network of distributors throughout the country for supply, liaison and backup support. Refer to the Superbuild International Ltd website (www.superbuild.co.nz) for your local Distributor.

1.3 Panel Sizes

All wall panels are manufactured in standard widths of 600mm with a choice of either tongue and groove or plain edge profiles. If the building height does not suit a 600mm increment, the top panel is usually cut on site. Panels can be site cut to fit gables or complex shapes, or to accommodate site changes.

The maximum panel length is 5.8m. Superbuild International Ltd recommends a maximum panel length of 5.6m; designs proposing the use of the longer 5.8m panels should be discussed with Superbuild International Ltd and their distributors at an early stage of the design process to establish the best combination of panel spans and cost efficiency.

Fig. 1.1 Typical panel details

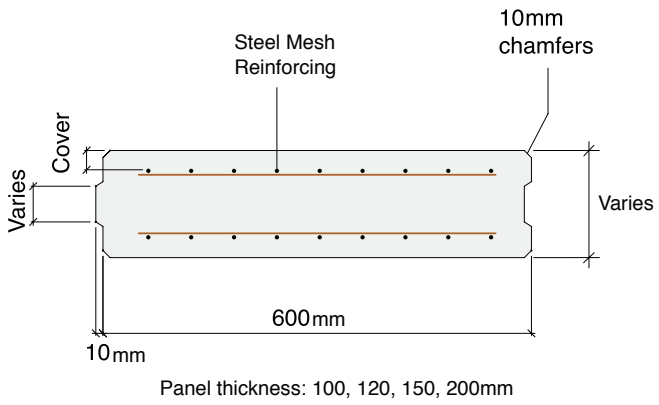


Fig. 1.2 Horizontal wall panel application.

2.0 Benefits

The many benefits of using Supercrete™ CIWS include:

- **Design flexibility:** Supercrete™ Wall Panels can be easily cut or drilled on site to suit design requirements. AAC is as workable as timber.
- **Lightweight:** Supercrete™ Wall Panels are approximately one quarter of the density of standard reinforced concrete. Therefore bracing demand is substantially reduced, as are freight costs to site. Crane capacity required for placement of panels is also reduced, with resultant cost savings.
- **Cost effective:** Installation time is very fast, especially if the design has been specifically done to reduce panel cutting.
- **Connections:** Fastening methods using Tension Ties are very simple and quick and require only a few minutes instruction.
- **Thermal performance:** Panels have all the inherent thermal insulation properties associated with AAC. No supplementary insulation is normally required.
- **Acoustic performance:** Supercrete™ AAC Panels are an excellent barrier to sound.
- **Fire Resistance:** All Supercrete™ CIWS Panel thicknesses (100, 120, 150, 200mm) have been tested in accordance with AS1530.4 exceeding all NZ Building Code fire rating requirements with an FRR of 240/240/240.
- **Coating substrate:** Installed wall panels provide a perfect substrate for Supercoat™ Coating Systems.
- **Durability and security:** Corrosion protected steel in solid AAC panels provide a high degree of durability and security.

3.0 Typical Applications

Supercrete™ CIWS are designed primarily for structures that are commercial or industrial in use. The panels have been used for shopping centres, school sports or assembly halls, warehouses, storage facilities, plant and generator buildings, and manufacturing plants. The CIWS is a non load bearing wall panel system with the panels secured to a structural support frame typically of structural steel, but it can be of reinforced concrete.

There are two types of CIWS walls. The first of these is the CIWS-H, shown in fig 3.1 below, where the panels are used horizontally. The second system is the CIWS-V which uses the panels vertically and is shown in fig 3.2. The choice of system depends on the building height and support column spacing as detailed in Section 4.0.

Fig. 3.1 Typical CIWS-H horizontal wall panel applications.

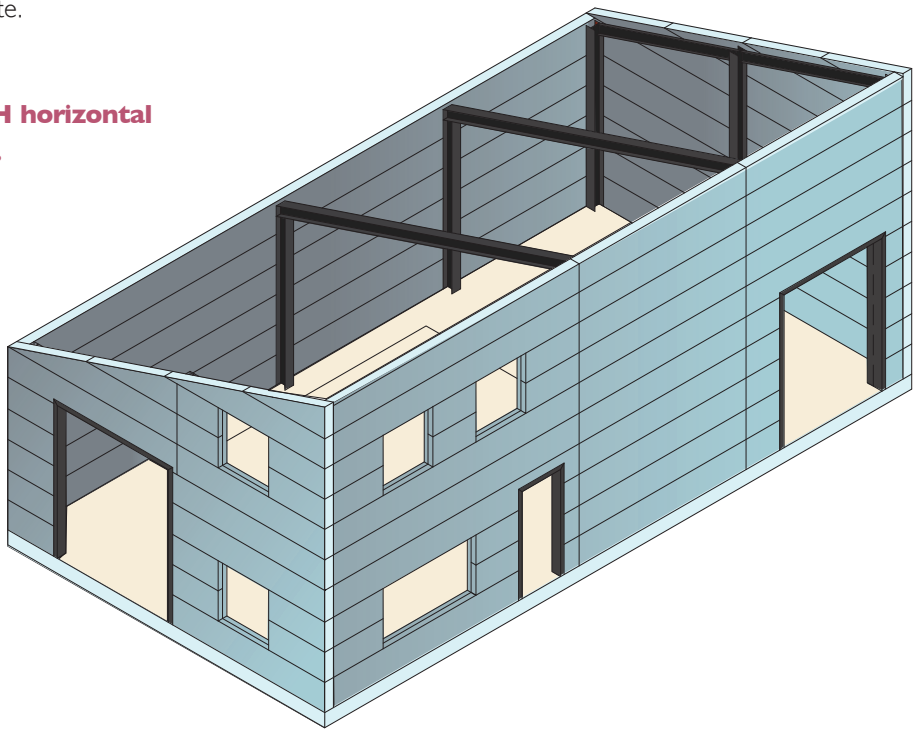
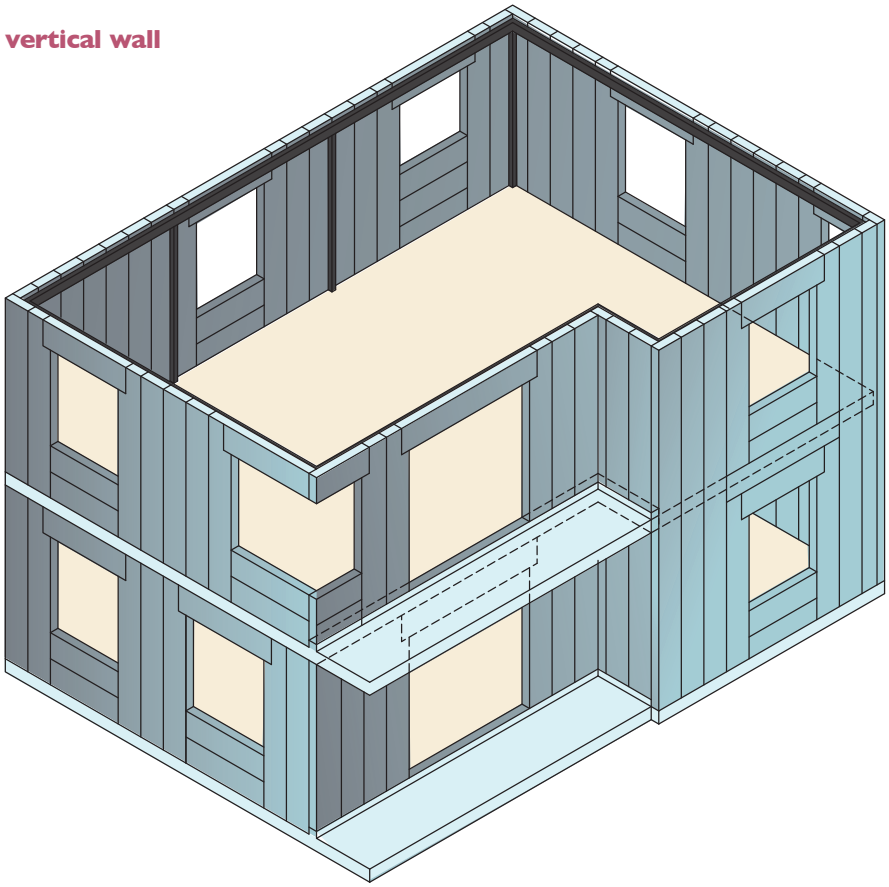


Fig. 3.2 Typical CIWS-V vertical wall panel applications.

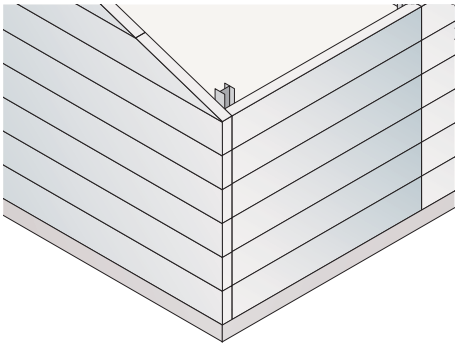
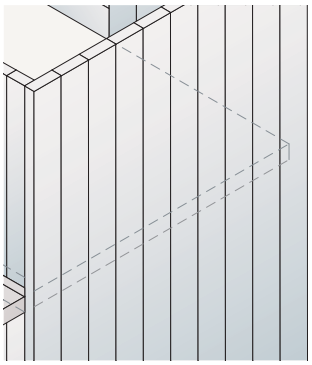


4.0 Selecting a CIWS System

The system characteristics of finished panel walls are the same regardless whether the panels are installed horizontally or vertically and are detailed below in table 4.1. Choice of system depends only on the size of the building, and the spans required. The choice of system should ideally be considered at the initial concept stage of the project to enable the most economic combination of panel thickness and support frame sizing to be used. If the column support spacing is less than 5.6 m (refer Section 1.3 for panel length greater than 5.6 m), then horizontal wall panels may be used. If the wall height is less than 5.6 m, then vertical wall panels may be used. Generally, horizontal wall panels are quicker to install, especially on higher buildings.

Table 4.1 System Selection Table for Supercrete™ CIWS

NB. Refer section 1.3 for clarification of limiting panel lengths

CIWS Type	**System Characteristics**
CIWS-H 	• Column support spacing is generally <5.6m. • Maximum wall height is <12m.
CIWS-V 	• Column support spacing is generally >5.6m. • Maximum wall height is generally <5.6m.

5.0 Design Overview

The choice of panel orientation and panel size will be governed by all of the following criteria:

- Purpose of the structure and any architectural requirements.
- Imposed design loads from wind, snow and earthquake loads, or any specific loadings unique to the building or its location.
- Fire resistance requirements.
- Thermal insulation requirements.
- Sound insulation requirements.
- Deflection requirements.
- Structural frame geometry and panel connection detailing.
- Durability.
- Moisture control.

In all cases, construction must comply with all parts of the NZ Building Code.

The following sections deal successively with structural requirements, durability, fire resistance, sound transmission, thermal performance, waterproofing, and design detailing.

6.0 Structural Design

6.1 Design Capacity of Supercrete™ Wall Panels

All wall panels are manufactured for specific design loads, provided by the designer to Superbuild International Ltd prior to manufacture, to allow the correct reinforcing to be used in each panel. Limiting ultimate design action effects are shown in Table 6.1 for varying panel spans and panel thicknesses. Lateral earthquake loadings on panel connections can be checked using the data in Table 6.2

6.2 Secondary Support framing

If the panel and structural framework have been designed concurrently, then the most economic combination should result. However, often the location of the supporting frame members will not allow panels to be directly fixed to the frame and a secondary support framing system must be added. In this case, mullions, or intermediate columns are required to break up the span of the panels. Secondary support framing is also required adjacent to openings which do not have sufficient capacity or stiffness to resist the additional loads redistributed from the opening and infill panels. In this case, angle or channel frames around the opening are required to transfer loads back to the main structural frame. Refer details 18.3.3 to 18.3.6 on page 36.

Note that if the wind suction loads or earthquake loads are sufficiently high, additional intermediate framing can be used to increase the number of panel connections. This also helps spread the load on the structure more uniformly and can result in a reduction in size of the primary supporting frame members.

6.3 End Bearing

All horizontal wall panels must have a minimum bearing support length of 50mm. However, Superbuild International Ltd recommends detailing a 60mm minimum end bearing to allow for construction tolerance. The ultimate design bearing stress of the AAC is 4.5MPa.

6.4 Cantilevered Panels

Both vertical and horizontal panels can be cantilevered past a supporting frame but the cantilever length is dependant on the applied loads. Contact Superbuild International Ltd for advice and limitations on cantilevering panels for specific applied loads.

Table 6.1 Maximum clear spans for wall panels

Thickness (mm)	Recommended Maximum Clear Span (m)									
	Ultimate Design Action Effect (kPa)									
	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
100*	3.00	3.00	3.00	3.00	2.85	2.70	2.55	2.40	2.30	2.20
120	4.50	4.50	4.50	4.25	4.00	3.85	3.70	3.55	3.45	3.30
150	5.85	5.85	5.85	5.45	5.20	4.95	4.75	4.60	4.45	4.30
200	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85

NOTE

(1) *Tongue and groove profile for this thickness is currently not available.

(2) All CIWS System thickness have been tested in accordance with AS1530.4 and have a fire resistance rating (FRR) of 240/240/240.

(3) For purposes of this table it is assumed that the chosen connections for the panels have the strength required to support the selected load.

(4) Design Action Effects above 3.00kPa to be referred to Superbuild International Ltd for specific design.

6.5 Connections

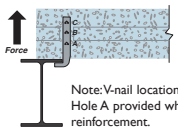
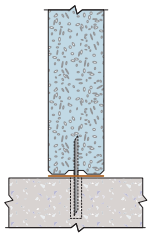
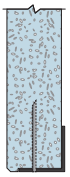
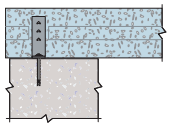
Details for connecting panels to support frames, are shown in Table 6.2. These fall into two main categories:

- Tension Ties: These are shaped stainless steel plates which hook around the supporting frame members and fasten to the top of the end of each panel using V nails driven into the top of H, or the sides of V panels. There are also variations on these which can be used to fasten panels in different orientations and to different materials.
- Dowels: Stainless steel dowels are used to locate panels on foundations, and also between panels where these finish at openings. Dowels can also be used to locate long panels over openings to a steel opening frame.
  In some types of structures using horizontal wall panels, (e.g. sound barriers), the wall panels can be slotted between the flanges of universal columns, and the flanges used to laterally restrain the panels. Care is required in detailing this type of construction to ensure that the ends of panels are snug between the flanges without any lateral movement possible. Also, consideration must be given to how waterproofing the ends of panels will be achieved.

Table 6.2 shows the connection types for securing the Supercrete™ Wall Panels to the structural framing.

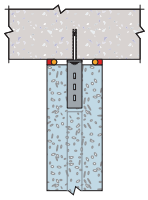
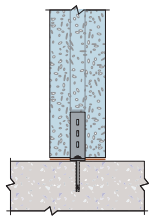
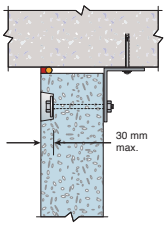
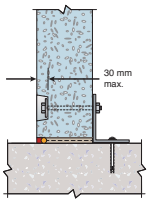
- The design capacity for the combinations of connection and Supercrete™ Wall Panel are presented in Section 6.6.
- The project engineer is responsible for specification of alternative details.
- Refer to Section 17.0 for connection component listings.

Table 6.2 Connection capacities in wall panels with AAC characteristic compressive strength, f'_c = 4.0

Connection Detail	Connection Number	Panel Thickness 'T' (mm)	Design Ultimate Load (kN)	Minimum Edge/End Distance (mm)	Capacity Reduction Factor and notes
 Note: V-nail location normally B & C. Hole A provided where a nail hits reinforcement.	C1.1A	120	1.40	50	Ø=0.6
		≥150	2.70	100	Ø=0.6
	C2.1A	120	*	*	Contact Superbuild International Ltd depends on dowel spacing, diameter, depth of embedment, etc
		≥150	*	*	Contact Superbuild International Ltd depends on dowel spacing, diameter, depth of embedment, etc
	C2.4A	120	*	*	Contact Superbuild International Ltd depends on dowel spacing, diameter, depth of embedment, etc
		≥150	*	*	Contact Superbuild International Ltd depends on dowel spacing, diameter, depth of embedment, etc
	C3.1A	120	-	-	-
		150	0.64	100	Ø=0.6

* Contact Superbuild International Ltd for connection capacity values.

Table 6.2 Connection capacities (cont.)

Connection Detail	Connection Number	Panel Thickness 'T' (mm)	Design Ultimate Load (kN)	Minimum Edge/End Distance (mm)	Capacity Reduction Factor and notes
	C4.1A	120	0.68	-	Ø=0.6
		≥150	1.00	-	Ø=0.6
	C4.2A	120	0.68	-	Ø=0.6
		≥150	1.00	-	Ø=0.6
	C5.1A	120	4.83	80	Ø=0.6, Maximum Rebate 30mm
		≥150	4.83	80	Ø=0.6, Maximum Rebate 30mm
	C5.2A	120	4.83	80	Ø=0.6, Maximum Rebate 30mm
		≥150	4.83	80	Ø=0.6, Maximum Rebate 30mm

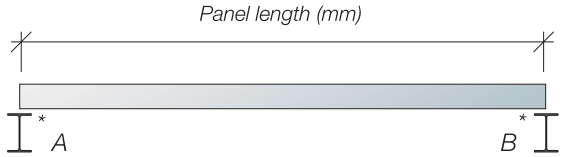
6.6 Design Capacity Tables

The following tables 6.3 and 6.5, give the maximum ultimate design wind loads for panel length and connection combinations for 120mm thick panels for both horizontal and vertical applications. Tables 6.4 and 6.6 give similar information for 150mm and thicker panels. Note that the allowable maximum span may be limited by the connection type at either end. If the connections are different, the maximum panel length allowed will be governed by the weaker connection.

Horizontal Panels

Fig. 6.2 Typical horizontal wall panel assemblies with no cantilever.

Plan View



Legend:
A - Connection A
B - Connection B
** - Connection location*

Elevation View

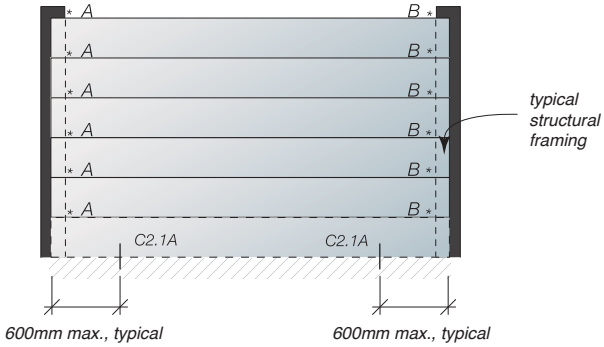


Table 6.3 120mm Horizontal panel with no cantilever

Panel length metres	Design Ultimate Wind Pressure (kPa)	
	Connection Type	
	C1.1A	C5.1A
2.00	2.33	4.5
2.25	2.07	4.5
2.50	1.87	4.5
2.75	1.7	4.5
3.00	1.56	4.5
3.25	1.44	4.5
3.50	1.33	3.96
3.75	1.24	3.24
4.00	1.17	2.62
4.25	1.1	2.25
4.50	*	*
4.75	*	*
5.00	*	*
5.25	*	*
5.75	*	*
6.00	*	*

***Not recommended**

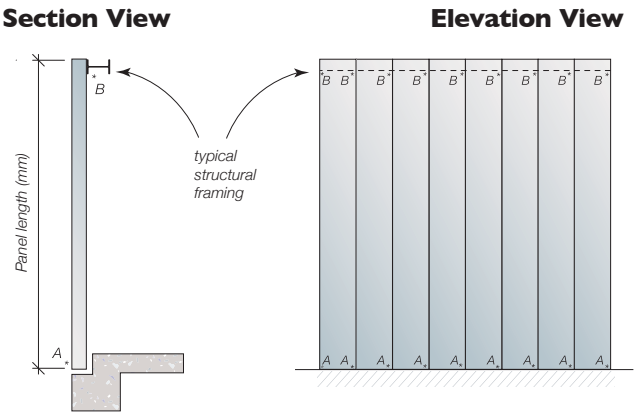
Governed by panel strength

Table 6.4 150mm & 200mm Horizontal panels with no cantilever

Panel length metres	Design Ultimate Wind Pressure (kPa)	
	Connection Type	
	C1.1A	C5.1A
2.00	4.5	4.5
2.25	4	4.5
2.50	3.6	4.5
2.75	3.27	4.5
3.00	3	4.5
3.25	2.77	4.5
3.50	2.57	4.5
3.75	2.4	4.29
4.00	2.25	4.03
4.25	2.12	3.79
4.50	2	3.58
4.75	1.89	3.39
5.00	1.8	3.22
5.25	1.71	3.07
5.50	1.64	2.93
5.75	1.57	2.8
6.00	1.5	2.68

Vertical Panels

Fig. 6.3 Typical vertical wall panel assemblies with no cantilever.



Legend:
A - Connection A
B - Connection B
** - Connection location*

Table 6.5 120mm Vertical panel with no cantilever

Panel length metres	Design Ultimate Wind Pressure (kPa)		
	Connection Type		
	C1.1A	C4.2A	C5.2A
2.00	2.33	1.13	4.5
2.25	2.07	1.01	4.5
2.50	1.87	0.91	4.5
2.75	1.7	0.82	4.5
3.00	1.56	0.76	4.5
3.25	1.44	0.7	4.5
3.50	1.33	0.65	3.96
3.75	1.24	0.6	3.24
4.00	1.17	0.57	2.62
4.25	1.1	0.53	2.25
4.50	*	*	*
4.75	*	*	*
5.00	*	*	*
5.25	*	*	*
5.50	*	*	*
5.75	*	*	*
6.00	*	*	*

Table 6.6 150mm & 200mm Vertical panels with no cantilever

Governed by panel strength

Panel length metres	Design Ultimate Wind Pressure (kPa)				
	Connection Type				
	C1.1A	C4.1A	C4.2A	C5.1A	C5.2A
2.00	4.5	1.67	1.67	4.5	4.5
2.25	4	1.48	1.48	4.5	4.5
2.50	3.6	1.33	1.33	4.5	4.5
2.75	3.27	1.21	1.21	4.5	4.5
3.00	3	1.11	1.11	4.5	4.5
3.25	2.77	1.03	1.03	4.5	4.5
3.50	2.57	0.95	0.95	4.5	4.5
3.75	2.4	0.89	0.89	4.29	4.29
4.00	2.25	0.83	0.83	4.03	4.03
4.25	2.12	0.78	0.78	3.79	3.79
4.50	2	0.74	0.74	3.58	3.58
4.75	1.89	0.7	0.7	3.39	3.39
5.00	1.8	0.67	0.67	3.22	3.22
5.25	1.71	0.63	0.63	3.07	3.07
5.50	1.64	0.61	0.61	2.93	2.93
5.75	1.57	0.58	0.58	2.8	2.8
6.00	1.5	0.56	0.56	2.68	2.68

7.0 Durability

7.1 Wall Panels

Supercrete™ Wall Panels are resistant to rot, insect and vermin attack, temperature variations, sunlight and fire. All steel reinforcing in the panels are dipped in a corrosion prevention agent. Supercrete™ Commercial & Industrial Wall Panel Systems meet the 50 year durability requirements of section B2 of the New Zealand Building Code.

7.2 Panel Connections

The connections supplied by Superbuild International Ltd are fabricated from 308 grade stainless steel which meets the durability requirements for cladding in Section B2 of the New Zealand Building Code. If other connections are detailed by the designer, it is the designer's responsibility to ensure that the alternatives also comply with the NZBC.

7.3 External Coating

The Supercrete™ CIWS System is a face sealed system. All external surfaces of the panels should be coated using the range of Supercoat™ Coating Systems which have been specially formulated to achieve the specific vapour permeability rates required to ensure that the system performs as intended. Guidelines for the coating systems are given in section 11.0 under "Waterproofing". Please refer to the Supercoat™ Coating Systems Technical Manuals which can be found at www.supercoat.co.nz.

7.4 Internal Coating

Typically the internal surface of the Supercrete™ CIWS Wall Panel System is left uncoated and open to the internal

environment for industrial applications, however this will depend on the buildings end use. Where corrosive conditions are present, it may be necessary to coat the panels to stop the ingress of gaseous chemical compounds bonded water vapour into the panels, this will need to be assessed. Like other cement based products, the Supercrete™ CIWS Panels need to be protected against high concentrations of carbon dioxide, sulphates, chlorides and strong acids.

Please contact Superbuild™ International or your local Supercrete™ Distributor for technical advise on coating solutions.

8.0 Fire Resistance Performance

8.1 NZ Building Code Fire Performance Provisions

All Supercrete™ CIWS Wall Panel thickness have been tested in accordance with AS1530.4 and have demonstrated to have a fire resistance rating of 240/240/240 minutes for structural adequacy, integrity and insulation. This is the highest rating required by the NZ Building Code for extreme fire risk cases. Generally, standard fire test furnaces are switched off after 241 minutes. Most structures only require a 30/30/30 minute rating, eight times less than that provided by 120mm and thicker Supercrete™ CIWS Wall Panels.

All supporting framework and panel connections must also be protected from fire to the same rating required by the entire structure. Building structures requiring a 180/180/180 minute fire rating or less can often be achieved by cladding support frames using our CodeMarked 75mm Supercrete™ Panel Cladding System, this system can achieve fire ratings of up to 180/180/180 minutes.

The NZBC states in clause C4.2c that "buildings shall be constructed to maintain structural stability during fire to avoid collapse and consequential damage to adjacent household units or other property". Thus when an external wall could collapse in the event of fire, due to failure of the support framework, it must be designed to collapse inwards.

The overall fire rating of a wall is affected by wall penetrations and the methods adopted to protect these penetrations. For example, a fire collar around a service pipe with a -/120/120 minute fire rating will restrict the overall fire rating of the wall to -/120/120 minutes, even if the wall panels have a fire rating of 240/240/240 minutes.

8.2 Design Considerations

Fire Stop Penetrations

Supercrete™ CIWS Wall Panels can be easily adapted to accommodate for penetrations such as pipes, electrical cabling and ducting from the spread of fire. The penetration is protected using proprietary products such as;

- fire rated sealants and intumescent products.
- fire collars and fire retardants.
- fire rated mortars.
- fire rated pillows.
- fire rated switch boxes.

recommends contacting the fire protection manufacturer to obtain the appropriate product/solution and installation method for the application and wall configuration.

9.0 Sound Transmission & Sound Insulation

9.1 Definitions

There are a number of rating systems for defining the effectiveness of a wall for sound insulation. The New Zealand Building Code uses the Sound Transmission Class (STC) but some other regulatory authorities use the Weighted Sound Reduction Index (Rw).

Sound Transmission Class (STC)

The STC value is a single number used to rate acoustic walls based on tests in an acoustic laboratory, where a test wall is constructed between two rooms that are acoustically isolated from each other. A sound is generated in one room and the sound level in the other room is measured, for frequencies between 100Hz and 5000Hz. The sound level differences are then normalized to allow for differences in various parts of the receiving room and for the absorption factor in the walls. These normalized values at each frequency band are compared to standard performance graphs where only a limited portion of the graph of sound loss is permitted to fall below the standard curve and the class is given by the highest standard contour line which is the best fit to the tested curve. The STC value is given by the value at 500Hz on the best fit curve. Effectively, it is the expected loss in decibels through the wall under laboratory conditions. In reality, actual sound reduction in site conditions is usually less than the STC value, due to flanking sound paths, quality of installation, detailing, room sizes and other factors. The NZBC allows a 5 decibel reduction from the STC under site conditions. The STC is the system developed by the American Society of Testing Materials (ASTM).

Weighted Sound Reduction Index (Rw)

The Rw is a weighted STC value where a correction factor is added to the STC value to take into account performance at lower frequencies. The Rw is a European system and is not currently used in the NZBC but it is gaining acceptance in many other countries. Typically, the Rw value is one or two decibels less than the STC value, as the correction value is usually negative.

Impact Isolation Class (IIC)

The IIC is usually used for floors only, but can be applied to walls. It quantifies the transmission of impact sound through a floor or wall. The test involves measuring the sound loss through a panel in a similar test setup as for the airborne sound in the STC test, but where the sound on one side is generated by a standard tapping machine. Higher numbers indicate less sound is being transmitted. The IIC is an American system which is gradually being replaced by the Ln,w value which is the ISO equivalent, but the NZBC at time of printing, still uses the IIC.

Acoustic Opinions

Sound Transmission Classes for specific configurations of walls are determined by professional acoustic consultants from computer models based on available test data with a 96% confidence of being within 2.5 decibels of a tested wall. These results are referred to as "opinions" as it is unrealistic to test every possible wall configuration.

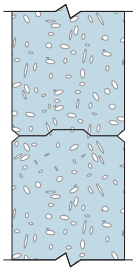
9.2 NZ Building Code requirements

Clause G6 of the NZBC requires that common walls between different occupancies must have an STC value of 55 or more. This can be achieved with a Supercrete™ CIWS Wall System by adding a 50mm steel stud frame on one side insulated with batts which have been spaced 20mm away from the Supercrete™ CIWS Panels or using a resilient mounted batten system. Acoustic requirements for commercial and industrial buildings are not covered by the NZBC and must be determined on a case by case basis. Buildings such as cinemas require higher STC values. Supercrete™ CIWS Wall Panels can be successfully used in such applications, configured to achieve up to STC 72.

9.3 Acoustic Performance

Table 9.1 is a basic summary of acoustic performance of bare Supercrete™ CIWS Wall Panels of varying thicknesses based on laboratory testing of the rendered panels. Increasing the STC rating is easily achievable with varying types of lining on one or both sides of the panel, varying cavity widths and supplementary insulation. However, acoustic analysis is not straight forward as different densities of material will absorb different frequencies of sound; combinations of different materials will also act differently. The STC for each layer of a wall cannot therefore be added together, to give a total STC for the wall, as the STC is a value based on all frequencies in the test range. It is recommended that you seek professional advice from an acoustic engineer where the acoustic performance of the wall must achieve a specific STC value.

Table 9.1 Acoustic Performance of Supercrete™ CIWS – Bare Panel Only.

Supercrete™ Wall Panel	STC (dB)	Construction
100mm thick panel	36	
120mm thick panel	37	
150mm thick panel	40	
200mm thick panel	43	

10.0 Energy Efficiency

10.1 Thermal insulation

The thermal insulation requirements of a building is specified in the NZ Building Code Section H1/AS1 with reference to NZS 4218:2009 for buildings less then 300m² in size and NZS 4243:2007 for buildings larger than 300m² in size.

Supercrete™ CIWS Wall Panels are classified as solid masonry and therefore the relevant insulation requirements are dependant on the geographical location demonstrated in figure 10.1. Tables 10.2 and 10.3 have been derived from these documents.

For large buildings, all panel thicknesses in Zone 1 have sufficient thermal insulation as a bare panel. In Zones 2 and 3, 200mm thick panels can be used as bare panels but 120mm and 150mm need additional insulation to meet the insulation requirement.

The R-value of individual components in a wall system can be added together to give the Construction R-value for the whole wall.

For example, if an R-value of 1.2 is required for Zone 3 and a 120mm thick panel is to be used:-

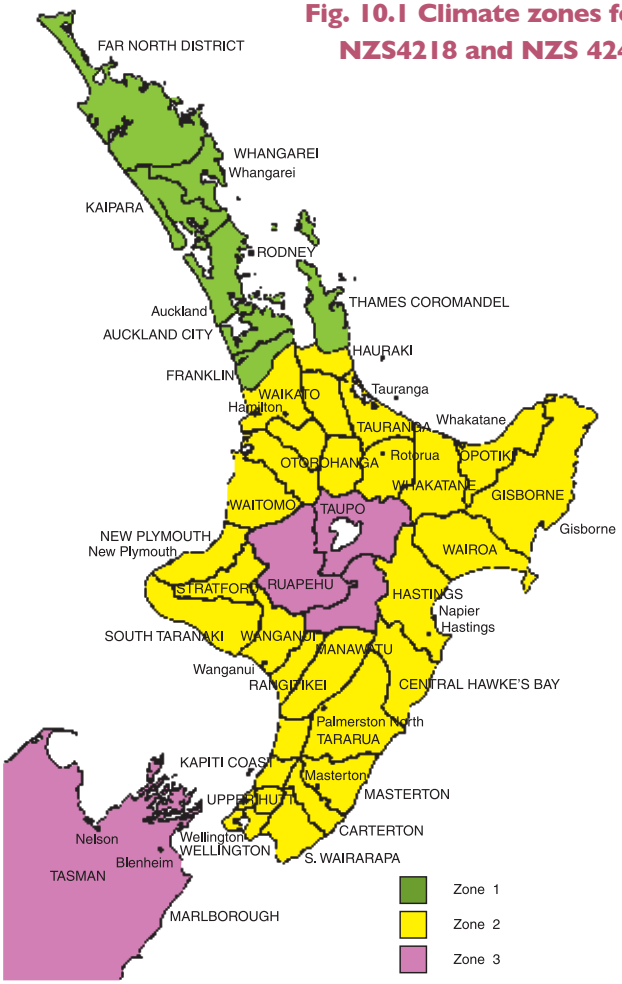
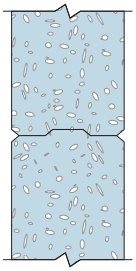


Fig. 10.1 Climate zones for NZS4218 and NZS 4243

Case 1	**Wall Component**	**R-Value**
	Outdoor Air Film	0.003
	Exterior Render	0.006
	120mm Wall Panel	0.80
	Interior Render	0.006
	Interior Air Film	0.12
	Construction R-value	0.935 **does not meet R1.2 requirement**
Case 2	Outdoor Air Film	0.003
	120mm Wall Panel	0.80
	20mm Batten airspace	1.01
	Interior 10mm Plasterboard Lining	0.06
	Interior Air Film	0.12
	Construction R-value	1.993 **exceeds R1.2 requirement**

Therefore a 120mm panel will still not meet the required R-value if rendered on both sides; it would need battened and lined with plasterboard on the inside to achieve the R-value required.

Table 10.1 Total R-Values – Bare Panel only.

Supercrete™ Wall Panel	Total R-Value (m^2.K/W)	Construction
120mm thick panel	0.80	
150mm thick panel	0.93	
200mm thick panel	1.06	

10.2 Air Tightness

Construction practice can significantly affect a buildings performance with poor sealing and finishing resulting in drafts. The tight manufacturing tolerances of Supercrete™ CIWS Panels results in walls with low infiltration rates. Testing on AAC Blocks have shown that air infiltration rates as low as 0.014% of the buildings volume are achievable.

Table 10.2 NZ Building Code Table 1 for Small Buildings

Building thermal envelope component	Minimum R-values (m²°C/W)		
	Climate zone 1	Climate zone 2	Climate zone 3
Roof	R 2.9	R 2.9	R 3.3
Wall	R 1.9	R 1.9	R 2.0
Floor	R 1.3	R 1.3	R 1.3
Glazing (vertical)	R 0.26	R 0.26	R 0.26
Glazing (skylights)	R 0.26	R 0.26	R 0.31

NOTE

(1) The R-values given in this table are those applicable to the reference building as described in the NZ Building Code

(2) Climate Zone Boundaries are shown in Figure 10.1

(3) If the sum of the area of glazing on the East, South and West facing walls (see Appendix H of NZS 4218) is more than 30% of the total wall area of all these walls, then the calculation or modelling method shall be used.

(4) Carpets or floor coverings are not included in the floor R-value. The floor R-value is met by concrete slab-on-ground floors and suspended floors with continuous closed perimeter with 100mm draped foil. Exposed floors will require additional treatment (e.g. pole houses)

(5) The R-values for glazing refer to whole window R-values (glass and frame). The values in this table are for a standard WERS window (Appendix G of NZS 4218). Any proposed area of glazing shall be considered to have an R-value as given in Appendix G of NZS 4218.

(6) There are no R-value requirements for the opaque parts of a door or a door set.

(7) Total area of skylights must be no more than 1.2m². The calculation or modelling methods must be used for designs where the total area of skylights is more than 1.2m².

(8) An R-value of 0.26 m² °C/W may be used for traditional leadlight glass when the total area of leadlight glass is no greater than 2.6m² and either the schedule method or calculation method is used.

(9) The R-value specified in Options 1b, 2b and 3b may only be used in the schedule method, i.e. shall not be used in the calculation or modelling methods.

(10) When using R-values for either Option a or b, all R-values for that option shall be used, i.e. roof, wall, floor and glazing. The R-values for a single building component shall not be substituted from one option to another.

(11) The table above allows buildings of solid construction to have lower R-values than buildings of non-solid construction, due to the benefits of appropriate use of thermal mass. Thermal mass must be used in conjunction with good passive design to increase comfort and reduce energy use. Use of the R-values in the above table requires that the thermal mass is accessible, i.e. inside the insulated building envelope. If additional bulk insulation material is required to achieve the R-values in this table, this insulation must be installed on the outside of the wall.

Table 10.3 - NZ Building Code H1/AS1 for Buildings, other than Housing, larger than 300m²

Building thermal envelope component	Minimum R-values (m²°C/W)	
	Climate zone 1	Climate zone 2&3
Roof (average including glazing)	R 1.9	R 1.9
Wall	R 0.3	R 1.2
Floor	No requirement	R 1.3
Glazing	No requirement	No requirement

NOTE

(1) The R-values given in this table are those applicable to the reference building as described in the standard NZS 4243

(2) Carpets and floor coverings are not included in the floor R-value. The floor R-value is met by concrete slab-on-ground floors and suspended floors with continuous enclosed perimeter with 100mm draped foil. Exposed floors will require additional treatment, e.g. office building with open car parking under.

11.0 Weatherproofing

11.1 Supercoat™ Coating Systems

The Supercrete™ CIWS Systems require the appropriate vapour permeable Supercoat™ Coating System to be applied to each side of the panels.

There are certain instances where the surface of the Supercrete™ CIWS Panel Systems will require to be coated using a non-vapour permeable Supercoat™ Waterproofing Membrane. The Supercoat™ Waterproofing Systems Technical Manual should be consulted for this.

General information on the coating systems available can be found in the Supercoat™ AAC Coatings Systems Technical Manual.

Both these manuals can be found on the Supercoat™ website www.supercoat.co.nz.

11.2 Waterproof vs Weather Resistant

The distinction between a **waterproof** coating and a **water resistant** coating is an important one.

Supercoat™ Acrylic Paints and Textures are **water resistant** in the sense that they will not allow water, as a liquid, to pass through them. Under normal atmospheric conditions the microscopic pores of the **water resistant** Acrylic coating are too small to allow liquid water to pass through them when they have been applied to an area where a sufficient fall provides adequate run off to avoid water pooling. **Water resistant** coatings will however, allow water vapour to pass through these pores when in a gaseous state. This enables internal moisture vapour, such as steam from cooking or washing and vapour from breathing etc., to escape the building, whilst preventing rain from entering. Most wall surfaces benefit from NOT being **waterproof,** but simply being **water resistant.**

By contrast, a **waterproof** coating has no pores to allow water liquid or vapour to pass. Supercoat™ Tanking Membrane is fully **waterproof** and therefore only suitable for selected wet areas, such as decks, parapet or balustrade tops, upper surfaces of sills, bathrooms, laundries or kitchen surfaces. Elsewhere, it is critical that only **water resistant** breathable coatings are used to avoid the problems caused by a build up of internal moisture.

11.3 Sealants

All movement control joints and gaps between panels and framing around openings must be sealed with one of the approved Holdfast sealants for fire rated and non-fire rated applications. Backing rods must be used where full depth joints are being sealed. Non-fire rated control joints with a nominal 10mm movement joint would use a 13mm Holdfast PEF Backing Rod. Where specific fire rated walls are required the Holdfast PEF Backing Rod would be double the diameter of the joint being sealed, i.e. for a nominal 10mm movement control joint a 20mm Holdfast PEF Backing Rod would be used. ALL Holdfast Sealant contact areas must be primed first using Supercoat™ Surface Sealer. Please contact Superbuild™ International or your local Supercrete™ Distributor for the appropriate Holdfast Sealant Systems.

12.0 Design and Detailing Considerations

12.1 Movement Joints

Movement Joint Types

Movement Joints are necessary to accommodate movements and to relieve any induced stresses due to; thermal expansion and contraction, different movements between materials and support structure movements (i.e. lateral sway or vertical deflection).

To accommodate these movements and to relieve the induced stresses, two categories of joints are used:

- Articulation Joints are provided to relieve the induced stresses due to support structure movement. These joints make the walls more flexible by breaking the walls into a series of modular sections. Differential movement between the Supercrete™ CIWS Panels and adjacent structural elements need to be accommodated with articulation joints.
- Control Joints are provided to relieve the induced stresses resulting from thermal expansion or contraction of the AAC, or differential movement between the AAC and another material or structure, such as abutting walls and columns of concrete or brickwork.

IMPORTANT NOTES

In the following Supercrete™ CIWS construction situations a control joint must be placed;

- At 6m maximum intervals of continuous wall runs.
- At all external and internal corners.
- At all junctions where Supercrete™ CIWS Panels abut different material.
- Movement joint locations and geometry must be positioned by the project designer.
- The project designer must confirm all movement joint widths as the magnitudes of expected horizontal and vertical movements (deflections) might vary from project to project.

Movement Joint Placement

Vertical control joints should coincide with control joints in the supporting structure and anywhere that significant structural movement is expected, where the wall abuts a vertical structure, such as a column, or adjacent to large openings.

Horizontal control joints should be placed between the top of the wall and slab soffits/angles or roof structures. The horizontal joints should accommodate any expected vertical deflection from the structure.

Movement Joint Width

The designer shall determine the joint width so that the sealant configuration can accommodate the calculated movements.

Typically the movement joint widths are as follows:

- 10mm minimum for vertical movement joints.
- 15mm minimum for horizontal movement joints.

All movement joints must be filled with an appropriate flexible sealant see Section 11.3.

12.2 Panel Layout

Supercrete™ CIWS is essentially a flexible modular construction system. By adopting a few simple rules, significant savings can be gained in time and cost, as well as reducing waste and panel handling time.

This is achieved by:

- Planning the panel layout with special attention given to the location of openings and penetrations.
- Adjacent to openings (windows and doors), we recommend a minimum 600mm wide panel be installed to distribute lateral loads from openings back to the support frame. For large openings, it may be necessary to provide additional structural steel to support the loads shed from the opening.

'Good Practice' and 'Bad Practice' layouts for vertically installed panels with various penetrations are illustrated in Figures 12.1 and 12.2. Horizontally installed panels are shown in Figures 12.3 and 12.4.

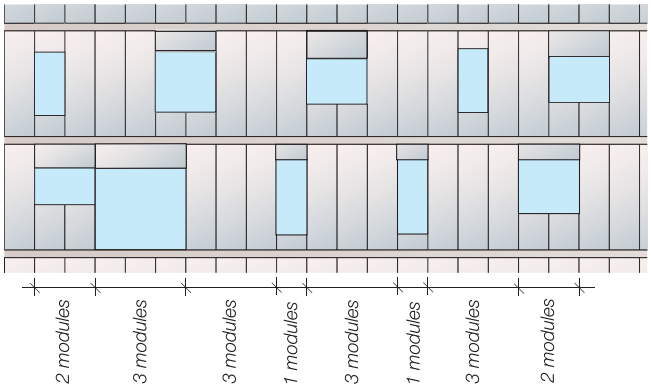
12.3 Penetrations

The allowable sizes of penetration holes in panels are shown in Detail 16.2.1. Details of any intended penetrations in the panels must be provided at the time of ordering the products from your local Supercrete™ Distributor so that this can be taken into consideration during the manufacturing process.

All small service penetrations through the panels should have the appropriate clearance around the service conduit so that the Holdfast Sealant, Backing Rod and/or fire sleeving can be inserted between the two, this will allow for differential movement.

Fig.12.1 Good practice panel/penetration layout – vertical panels.

CORRECT



Good panel layout makes best use of 'module' size and location for all openings to reduce on-site panel cutting

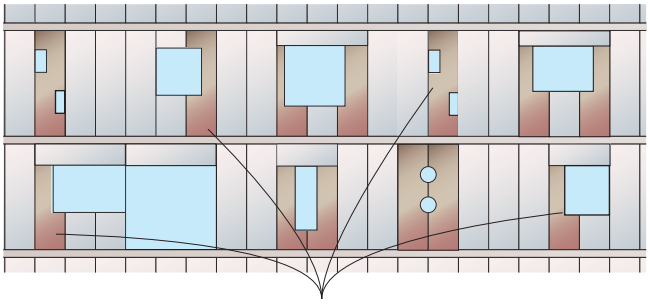
12.4 Deflection Limits of Supports

The Supercrete™ CIWS walls shall be considered masonry when selecting the deflection limits for the supporting structure. These deflection limits should include building movements such as:

- **Base support -** The concrete foundation or steel beam support.
- **Top of wal -** This should include the lateral deflection of the main structure of the building.
- **Sway movements -** Lateral sway of the main structure of the building, so that excessive stress is not induced.

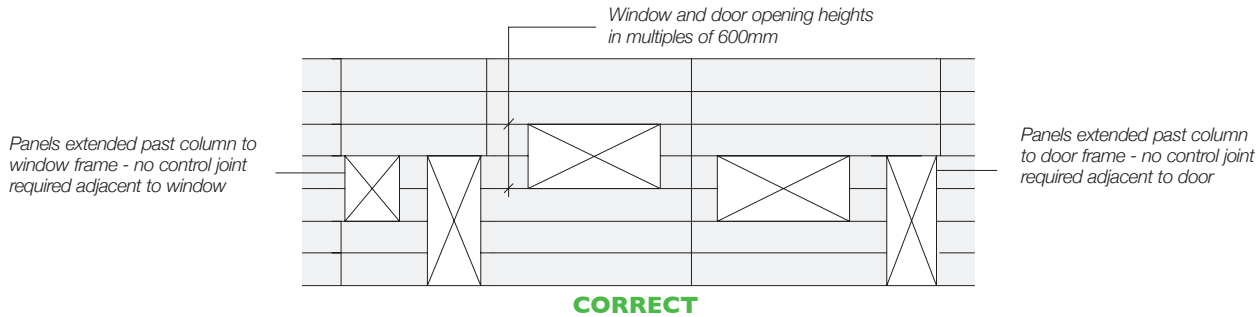
Fig. 12.2 Poor practice panel/penetration layout – vertical panels.

INCORRECT



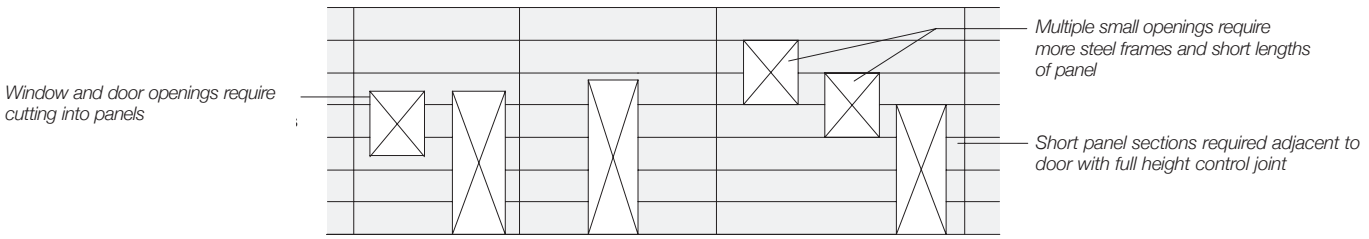
Poor panel layout results in complex on-site cutting of panels

Fig. 12.3 Good practice - horizontal panels.



CORRECT

Fig. 12.4 Poor practice - horizontal panels.



INCORRECT

13.0 System Components

13.1 General System Components

A summary of the components or their equivalents that Superbuild International Ltd recommends for use in the CIWS system is shown in Table 13.1

Table 13.1 System components summary.

System component	CIWS Type	
	CIWS-H	CIWS-V
Supercrete™ CIWS Panels	✓	✓
Supercoat™ AAC Superbond Adhesive	✓	✓
Supercoat™ Superbase Render/Mortar	✓[2]	✓[2]
Supercoat™ Anti-corrosion Coating	✓	✓
DPC	✓[2]	✓[2]
Steel Base Angle	✓[2]	✓[2]
Fasteners/Fixings	✓	✓
Holdfast Fire/Acoustic Sealants	✓	✓
Supercoat™ Coating Systems	✓[1]	✓[1]

Note:

1 Use as required.

13.2 Supercrete™ CIWS Panels

The Supercrete™ CIWS System is manufactured in a range of stock sizes as detailed in the Table 13.2. Typical dimensions have been shown previously in Figure 1.1.

Custom panel length and width sizes are available on request. These are usually made to suit column to column distances or floor to soffit wall heights, thus reducing installation time and off-cut waste. Custom panel lengths and widths can in many circumstances be manufactured to the exact lengths required. Standard panels are able to be cut to on site due to the higher level of reinforcement.

Table 13.2 Standard & Custom manufactured panel sizes.

Panel dimensions			Weight[1] (kg/m²)
Thickness (mm)	Length (mm)	Width (mm)	
100	1800 to 5800	600	68
120	1800 to 5800	600	82
150	1800 to 5800	600	102
200	1800 to 5800	600	136

Note:

1 *average weight of panels at 30% moisture content

13.3 Supercoat™ Superbase Render & Mortar

Supercoat™ Superbase Render(supplied in 25kg bags) can be used as a levelling coat for rebates. Site mixed cement based bedding mortar can also be used.

13.4 Supercoat™ AAC Superbond Adhesive

Fig. 13.2 Supercoat™ AAC Superbond Adhesive.

Supercoat™ AAC Superbond adhesive (supplied in 25kg bags) is used for gluing the panels together at vertical and horizontal joints. The adhesive has over twice the strength of the AAC panels. It can also be used for patching any damaged panels by combining with Supercrete™ dust to make a filler.

13.5 Anti-Corrosion Coating Agent

Steel reinforcing exposed on cut panels are to be coated with a liberal application of Supercoat™ anti-corrosion agent supplied by Superbuild International.

13.6 Holdfast Sealant

All gaps in internal and external junctions and movement joints must be filled with the appropriate Holdfast Sealant. For further information refer to Section 11.3.

13.7 Supercoat™ Coating Systems

At the very least, for low performance specifications, the Supercrete™ CIWS Panels may be simply painted with one of the various Supercoat™ exterior acrylic paint systems. This option is only available for walls in certain situations. All surface blemishes and imperfections, scratches and glue joints will be visible through directly painted panels.

Ideally, purpose designed, cost effective acrylic textures such as Supercoat™ Hoppertex applied over a base of Supercoat™ Superbuild™ Render should be used to provide a durable finish.

For more information on the various coating systems available please visit the www.supercoat.co.nz or contact Superbuild International for further information.

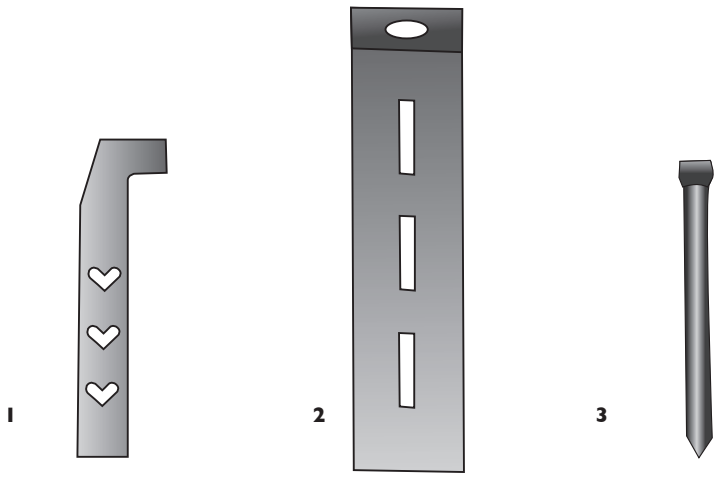
13.8 Brackets, Fasteners & Fixings

For securing Supercrete™ CIWS Panels to various support structures a number of different brackets and fixings are used, these items are supplied by your local Supercrete™ Distributor and are shown in Fig 13.4.

13.9 Anchors

There are a wide variety of anchoring devices that are suitable for fixing into Supercrete™ CIWS Panels. Generally, anchors that have a plastic sleeve where the two ends of the sleeves are drawn together by the screw to knot up inside the AAC, are the best type. Some straight expansion type sleeves are not as successful because the AAC continues to crush as the screw is driven in and the sleeve expands. Refer to the Supercrete™ Fixings Design Guide which is available for download from www.superbuild.co.nz..

Fig. 13.4 Brackets and fixings.



1 – Tension Tie

2 – Slotted Angle Bracket

3 – V-nails

For more information on how these and other brackets and fixings are used in various connection assemblies, please refer to Sections 6.0, 17.0, 18.0 and 19.0.

14.0 System Installation

14.1 Installation of CIWS Walls

14.1.1 Read all Specification Sheets

Before commencing any installation work make sure that all the specification sheets and details have been read and understood. Make sure that you have all the required material and drawings that are necessary to do the job.

14.1.2 Setting out and Positioning of Walls

Before commencing any installation work, clean up the work area. Mark out the location of the walls, doors and windows, etc.

14.1.3 Installation of Steel Base Angle

The steel base angle is required in situations where the Supercrete™ CIWS Panels are located in front of the slab or over openings. It is also required where the height of the panels exceeds more than 12m. The angle must be installed in accordance with the project engineer's specifications and details.

14.1.4 Panel Preparation

Supercrete™ Wall Panels should be sized and prepared before laying the Mortar down or applying Adhesive. The panels can be trimmed on-site using a circular saw equipped with diamond tipped cutting blade. All the loose Supercrete™ AAC particles should be brushed off the panel with a rough broom. Steel reinforcement that is exposed on cut panels must be coated with a liberal application of anti-corrosion agent (see Section 13.5). Any minor damage and chips to the panels must be repaired using Supercoat AAC Superbond Adhesive (thicken with AAC dust if required).

14.1.5 Mortar Installation

Panels sitting on top of concrete or masonry base supports must be bedded on Mortar.

Flashings or DPC bond breakers are used in conjunction with Mortar. These are usually sandwiched into Mortar or installed directly on top of the concrete or masonry supports.

The thickness of the mortar bed is approximately 10mm and should be installed across the full thickness of the wall panels. Mixing of the mortar should be done in accordance with the instructions on the bag.

14.1.6 Supercrete™ Wall Panel Installation

When the preparation of the wall panel is complete locate the panel into its final position using a crane and scissor lift or pin lifter. Then secure the panel to the support structure with appropriate types of fixings and brackets. When the panel is secured in place apply Supercoat™ AAC Superbond Adhesive to the panel edge where the next wall panel is to be installed. Repeat the installation process until the wall is complete.

14.1.7 Supercoat™ AAC Superbond Adhesive Application

The Supercrete™ CIWS Panel edge to which Supercoat™ AAC Superbond Adhesive is to be applied should be thoroughly cleaned down with a dry brush to ensure that the surface is free of any AAC dust and foreign particles that may inhibit adhesion. The panel edge should then be wet down with a water spray bottle prior to the application of the adhesive. Adhesive is applied to the panel with a notched trowel or broad knife. When the panels are pushed together the joints are to be 2 - 3mm thick. Sufficient pressure must be applied to the panels when gluing to ensure the adhesive is fully bedded across the joint, excess should ooze out the front face of the panel joint. Scrape off any excess adhesive protruding from the joint once the panel has been installed. Mixing and application of the Supercoat™ AAC Superbond Adhesive should be done in accordance with the relevant technical literature which can be found at www.supercoat.co.nz.

14.1.8 Application of Holdfast Sealants

All movement joints and other gaps should be sealed off and finished neatly with the appropriate MS, fire and acoustic rated sealants from Holdfast. Application of these sealants must be carried out in accordance with the relevant technical specifications and the manufacturers literature.

14.1.9 Plasterboard

If required, plasterboard can be direct fixed (glued and nailed) to the Supercrete™ CIWS Panels or secondary framing structure like steel studs and battens. Contact Superbuild International for technical support.

14.1.10 Installation of Penetrations, Electrical, Plumbing and Other Services

Installation of services and penetrations through Supercrete™ CIWS walls should be carried out at the appropriate stage in the construction sequence. This will allow easy access to cavities, steel framed elements and Supercrete™ CIWS Panels, where services can be easily installed and neatly hidden.

Neat finishes for all chasings and penetrations is necessary to maintain the acoustic and fire integrity of the wall. Chase no deeper than 25mm into panel face.

14.1.11 Application of Supercoat™ Coating Systems

Supercoat™ Coating Systems must be applied in accordance with the relevant technical literature. In particularly the Supercoat™ AAC Coating Systems Technical Manual and the relevant product data sheets, all of which is available for download from www.supercoat.co.nz.

14.1.12 Installation of Fasteners & Fixings

All non-Supercrete™ fixings and fasteners such as those used for attaching shelves and furnishing should be installed in accordance with the manufacturers specifications.

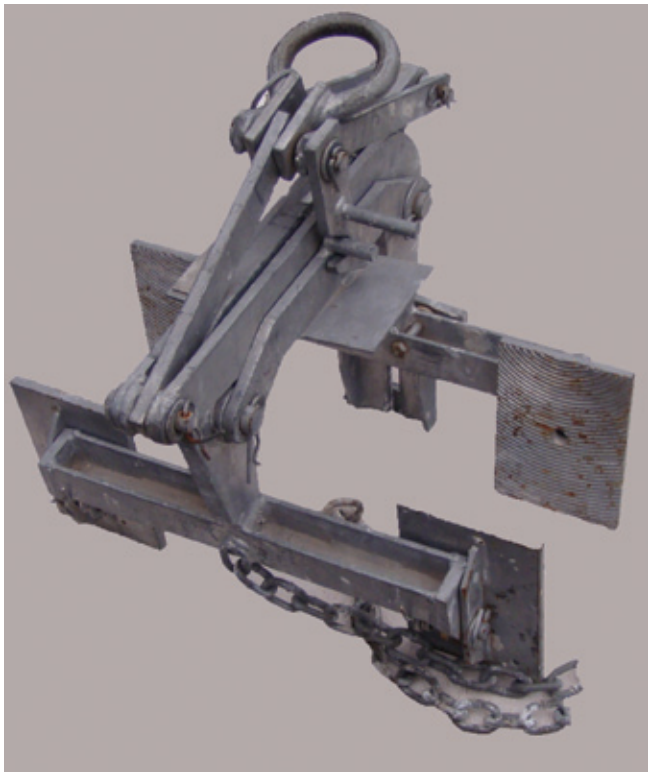
All brackets and fixings used for securing Supercrete™ Wall Panels to the support structure should be specified by the project engineer. Installation of these brackets and fixing to be in accordance with the manufacturer's or project engineer's instructions.

15.0 Panel Handling

15.1 Panel Handling

Superbuild International Ltd does not recommend manhandling of panels to shift them around a site, or installation. Even though they are only a quarter the weight of standard reinforced concrete, they are still heavy and should be handled using a crane with a scissor lift or pin lifter, available on loan from Superbuild International Ltd and their distributors.

Fig. 15.1 Horizontal panel scissor lift attachment.



15.2 Health, Safety & Personal Protective Equipment (PPE)

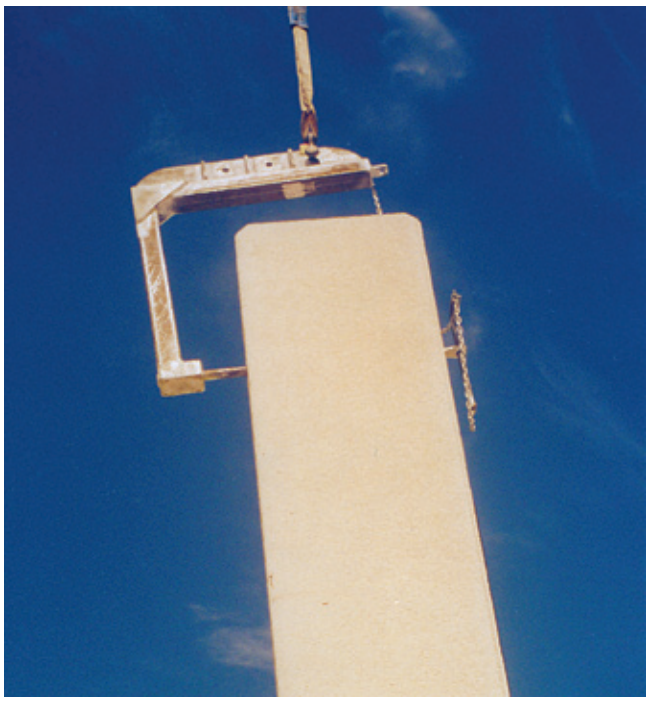
Supercrete™ Products are cement-based, which may irritate the skin, resulting in itching and occasionally a red rash. The wearing of gloves and suitable clothing to reduce abrasion and irritation of the skin is recommended when handling Supercrete™ Products.

Approved respirators (AS/NZS1715 and AS/NZ1716) and eye protection (AS/NZ1336) should be worn at all times when cutting and chasing. Refer to the Supercrete™ Material Safety Data Sheets and the Supercrete™ Properties and Handling Design Guide which is available for download from www.superbuild.co.nz.

The use of power tools when cutting any concrete products causes dust, which contains respirable crystalline silica, with the potential to cause bronchitis, silicious and lung cancer after repeated and prolonged exposure. When using power or hand tools, on Supercrete™ Products, wear a P1 or P2 respirator and eye protection. When cutting, routing or chasing Supercrete™ Products with power tools, use dust extraction equipment and wear hearing protection.

Fig. 15.2 Standard personal protection equipment used when handling/cutting Supercrete™ Wall Panels.

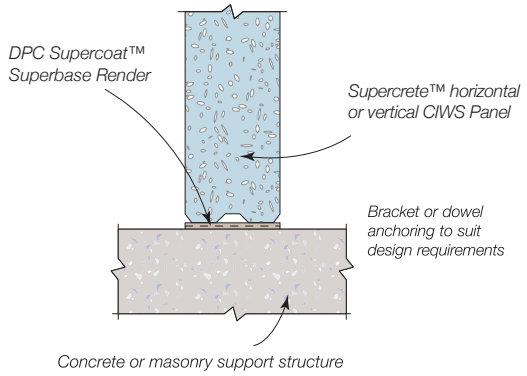
Fig. 15.3 Vertical panel pin lift attachment.



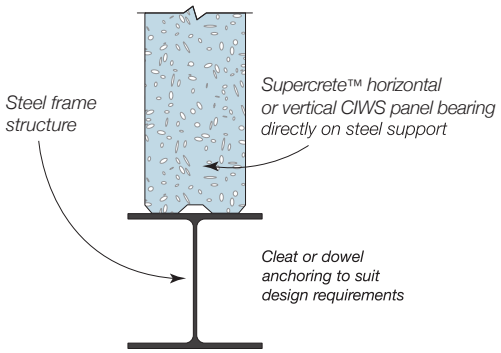
16.0 Construction Details - General

16.1 Wall Panel General Details

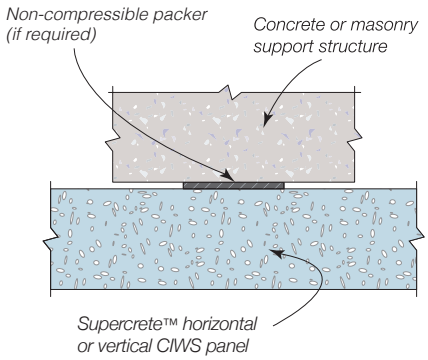
Detail 16.1.1 Horizontal bearing surfaces and concrete/masonry support intercaction detail.



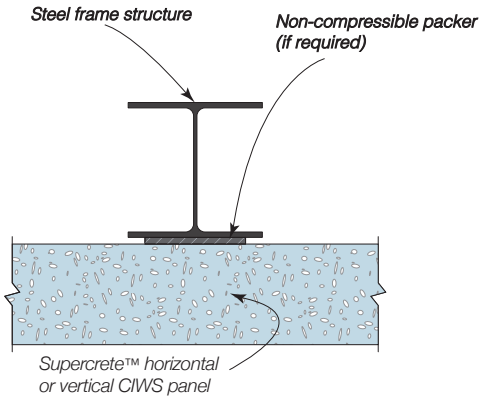
Detail 16.1.2 Horizontal bearing surfaces and steel support interaction detail.



Detail 16.1.3 Vertical bearing surfaces and concrete/masonry support interaction detail.

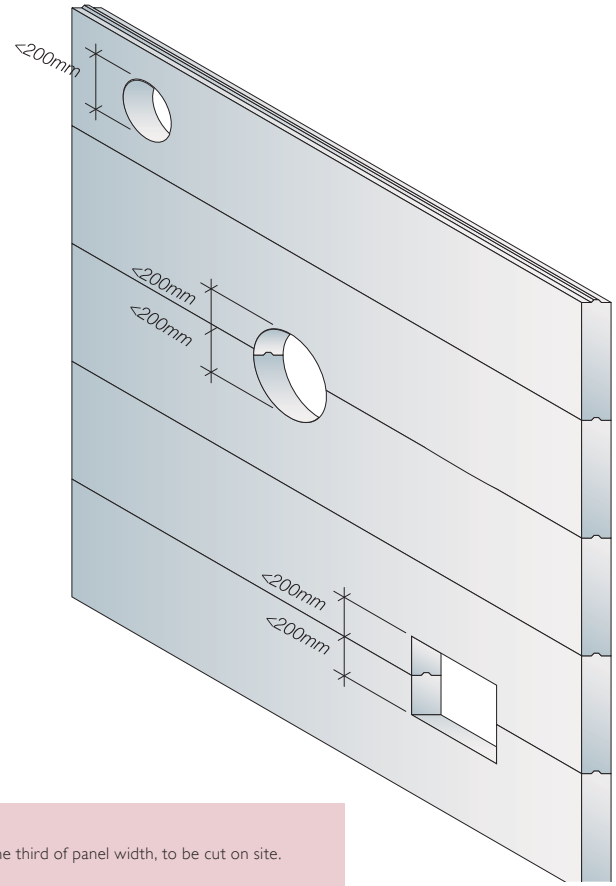


Detail 16.1.4 Vertical bearing surfaces and steel support interaction detail.



16.2 Wall Panel General Details - Penetration Details

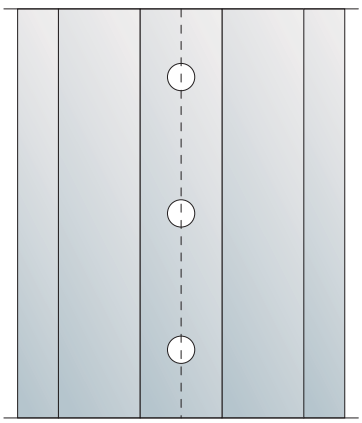
Detail 16.2.1 Penetration Positioning and Sizing for both Horizontal and Vertical Panels.



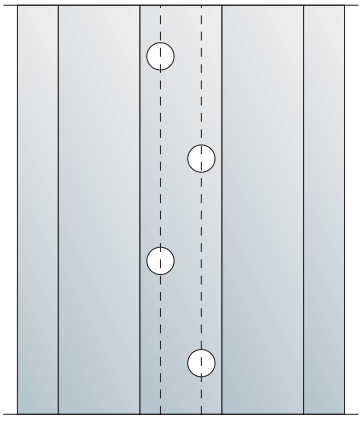
1) Width of the opening to be less than one third of panel width, to be cut on site. All panels shown are 600mm wide.
2) Notch should not be overcut as additional reinforcement could be cut which would reduce the panel's performance.
3) Max width of opening to be one third panel width,
4) Opening sizes above based on 600mm wide panel.
5) Position and size of opening should be strictly adhesed to avoid cutting reinforcement.

Detail 16.2.2 Multiple Penetration Arrangement - Applies to both Vertical and Horizontal Panels.

CORRECT



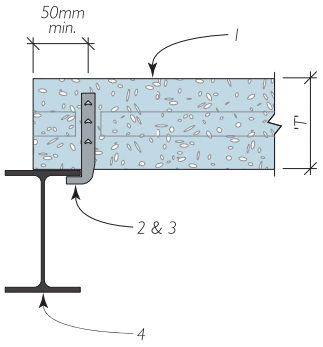
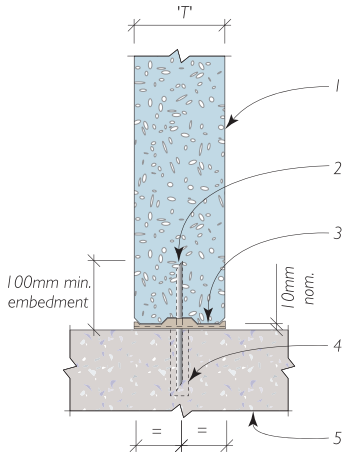
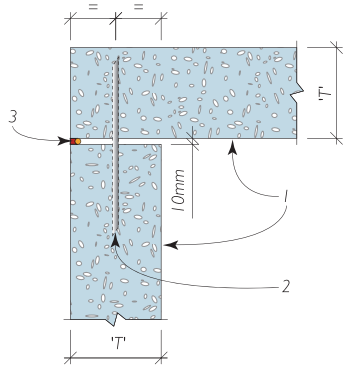
INCORRECT



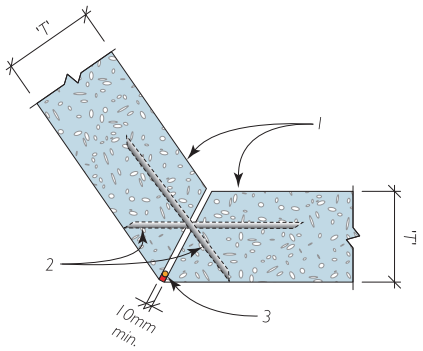
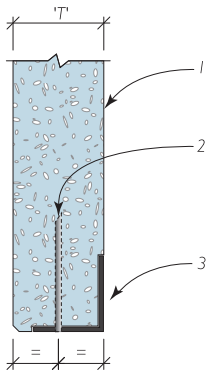
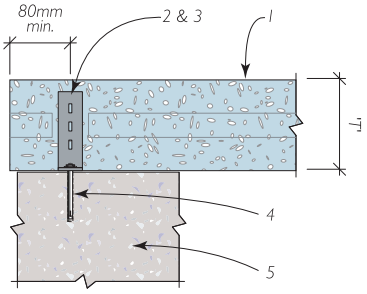
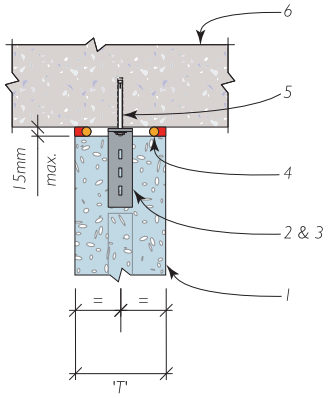
Where penetrations do not align, contact Superbuild™ International Ltd for advice. If aligning openings is not possible consult Superbuild™ International Ltd.

17.0 Construction Details - Connections

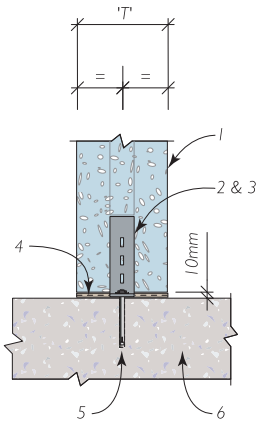
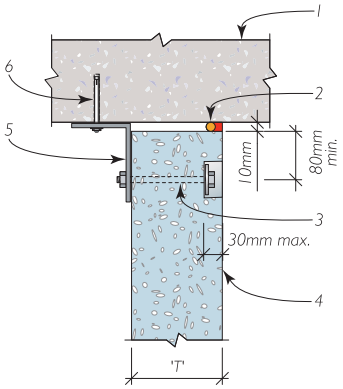
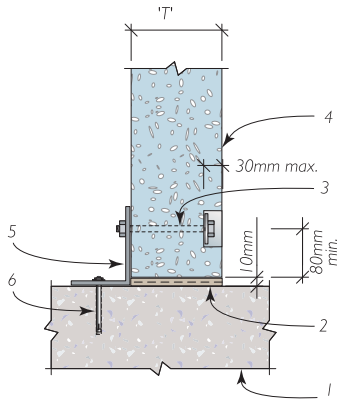
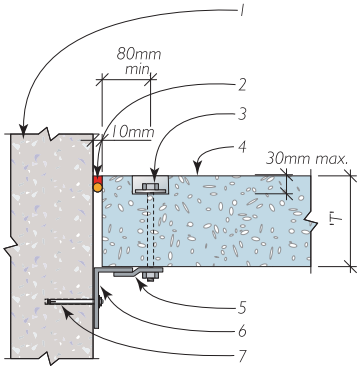
17.1 Panel Connection Details

DETAIL 17.1.1		*Connection No.*	*Connection component list*
		C1.1A	1) Supercrete™ Wall Panel (of thickness 'T') 2) Tension tie (to suit 'T') 3) 2 x `V'-nails 4) Steel frame structure
DETAIL 17.2.1		C2.1A	1) Supercrete™ Wall Panel (of thickness 'T') 2) ø10mm x 200mm long, stainless steel dowels 3) Supercoat™ Superbase Render & DPC 4) Epoxy grout 5) Concrete support structure
DETAIL 17.2.2		C2.2A	1) Supercrete™ Wall Panel (of thickness 'T') 2) ø6mm x 300mm long, stainless steel dowels 3) Backing Rod & Holdfast Sealant
		C2.2B	1) Supercrete™ Wall Panel (of thickness 'T') 2) ø10mm x 200mm long, stainless steel dowels 3) Backing Rod & Holdfast Sealant

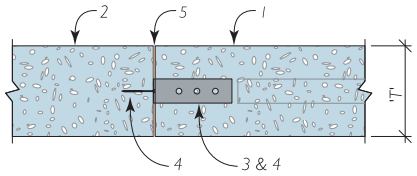
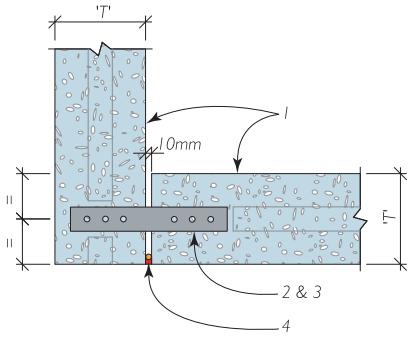
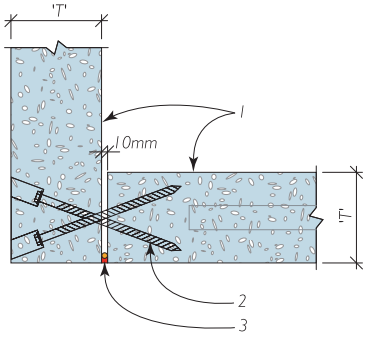
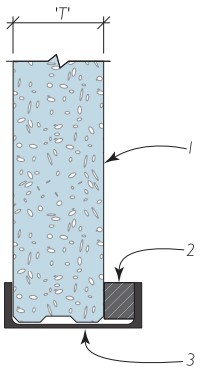
For connection capacities refer to the Connection Capacity Tables in Section 6.5

DETAIL 17.2.3		*Connection No.*	*Connection component list*
		C2.3A	1) Supercrete™ Wall Panel (of thickness 'T') 2) ø6mm x 300mm long, stainless steel dowels 3) Backing Rod & Holdfast Sealant
		C2.3B	1) Supercrete™ Wall Panel 2) ø10mm x 200mm long, stainless steel dowels 3) Backing Rod & Holdfast Sealant
DETAIL 17.2.4		C2.4A	1) Supercrete™ Wall Panel 2) ø10mm x 200mm long, stainless steel dowels 3) Steel frame structure
DETAIL 17.3.1		C3.1A	1) Supercrete™ Wall Panel (of thickness 'T') 2) Slotted angle bracket 3) 2 x 14-10 x 65mm coarse thread bugle head screws 4) Concrete anchor 5) Concrete support structure
DETAIL 18.4.1		C4.1A	1) Supercrete™ Wall Panel (of thickness 'T') 2) Slotted angle bracket 3) 2 x 14-10 x 65mm coarse thread bugle head screws 4) Backing Rod & Holdfast Sealant 5) Concrete anchor 6) Concrete support structure

For connection capacities refer to the Connection Capacity Tables in Section 6.5

		Connection No.	Connection component list
DETAIL 17.4.2		C4.2A	1) Supercrete™ Wall Panel (of thickness 'T') 2) Slotted angle bracket 3) 2 x 14-10 x 65mm coarse thread bugle head screws 4) Supercoat™ Superbase Render & DPC 5) Concrete anchor 6) Concrete support structure
DETAIL 17.5.1		C.5.1A	1) Concrete structure 2) Backing Rod & Holdfast Sealant 3) M12 4.6/S Galvanised Bolt & 50 x 50 x 3mm Washer 4) Supercrete™ Wall Panel (of thickness 'T') 5) Steel support angle 6) Concrete anchor
DETAIL 17.5.2		C.5.2A	1) Concrete structure 2) Supercoat™ Superbase Render & DPC 3) M12 4.6/S Galvanised Bolt & 50 x 50 x 3mm Washer 4) Supercrete™ Wall Panel (of thickness 'T') 5) Steel support angle 6) Concrete anchor
DETAIL 17.6.1		C.6.1A	1) Concrete structure 2) Backing Rod & Holdfast Sealant 3) M12 4.6/S Galvanised Bolt & 50 x 50 x 3mm Washer 4) Supercrete™ Wall Panel (of thickness 'T') 5) 'Z' plate bracket 6) Steel support angle 7) Concrete anchor

For connection capacities refer to the Connection Capacity Tables in Section 6.5

DETAIL 17.7.1		*Connection No.*	*Connection component list*
		C7.1A	*1) Supercrete™ Horizontal Wall Panel (of thickness 'T')*
			2) Supercrete™ Vertical Wall Panel (of thickness 'T')
			3) Angle Bracket bent from Lumberlok SSMB15 MultiBrace
			4) 3 x 14-10 x 65mm coarse thread bugle head screws each leg
			5) Supercoat™ AAC Superbond Adhesive
DETAIL 17.8.1		C8.1A	*1) Supercrete™ Wall Panel (of thickness 'T')*
			2) Wall Tie from Lumberlok SSMB15 MultiBrace
			3) 3 x 14-10 x 65mm coarse thread bugle head screws each panel
			4) Backing Rod & Holdfast Sealant
DETAIL 17.9.1		C9.1A	*1) Supercrete™ Wall Panel (of thickness 'T')*
			2) 200mm Hex Head Course Thread Fixing Screws
			3) Backing Rod & Holdfast Sealant
DETAIL 17.10.1		C10.1A	*1) Supercrete™ Wall Panel (of thickness 'T')*
			2) Non-Compressible non-degradable packer
			3) Steel frame structure

For connection capacities refer to the Connection Capacity Tables in Section 6.5

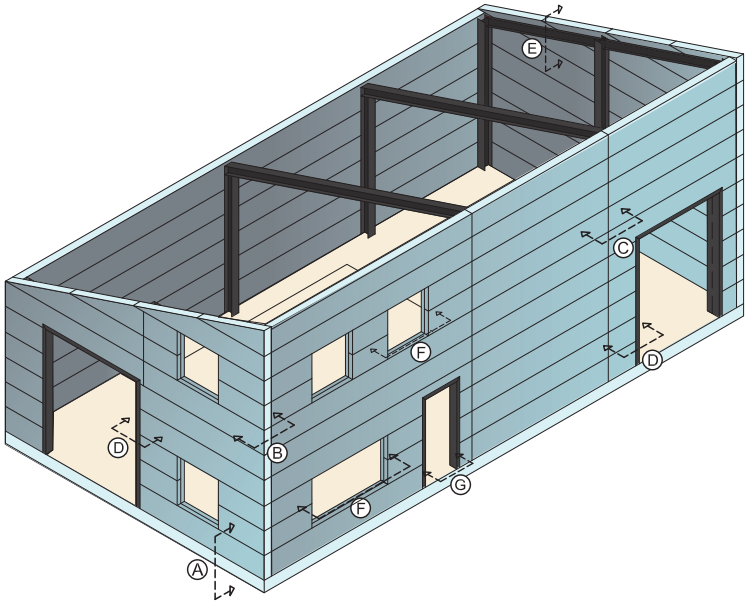
18.0 Construction Details - Horizontal Panels

18.1 Horizontal Panels - Isometric, Plan & Elevation Views

Detail 18.1.1 Isometric view.

SECTION REFERENCES

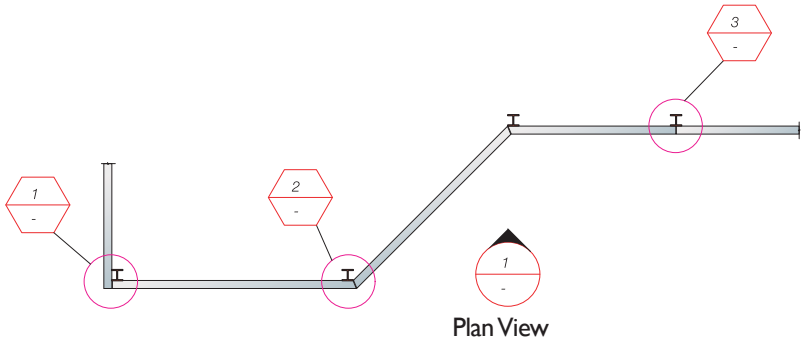
A=19.2.1	E=19.2.11
B=19.2.4	F=19.3.3
C=19.2.3	G=19.3.6
D=19.2.9	



Detail 18.1.2 Plan view and elevation view.

DETAIL REFERENCES

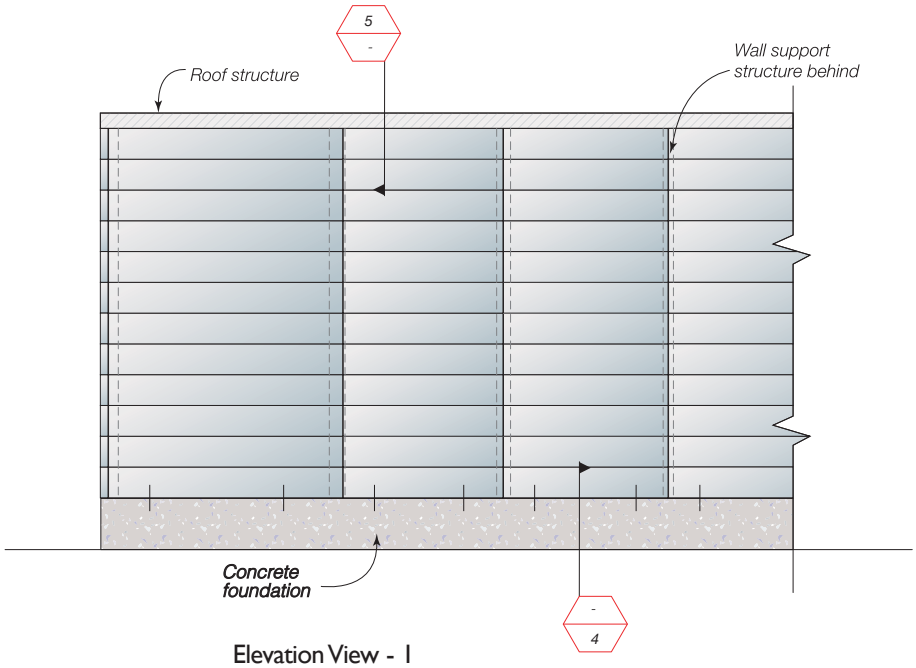
1=19.2.4	3=19.2.3
2=19.2.6	



Plan View

SECTION REFERENCES

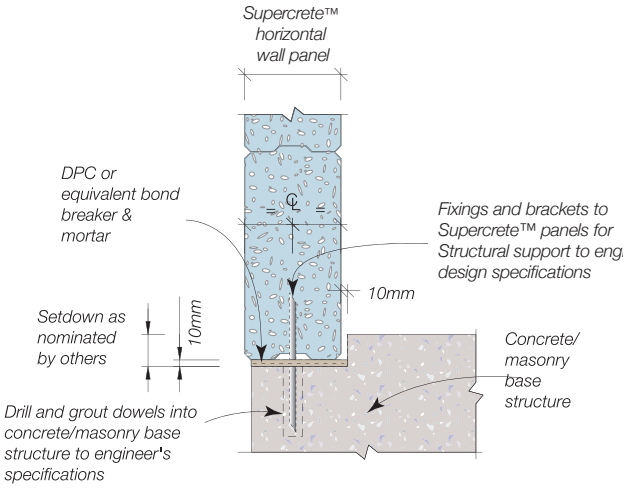
4=19.21	5=19.2.11



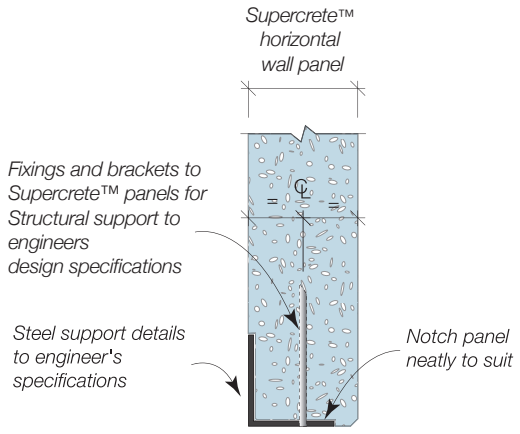
Elevation View - 1

18.2 Horizontal Panels - Junction Details

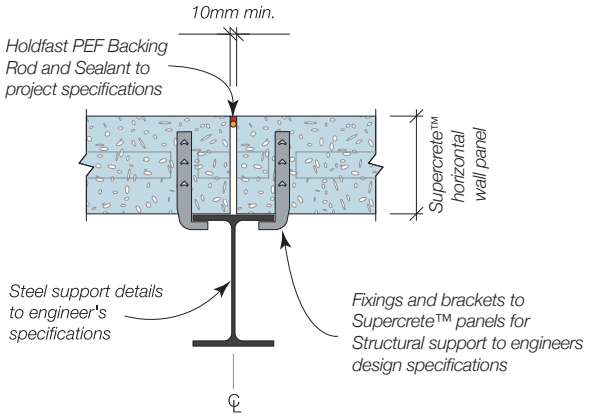
Detail 18.2.1 Horizontal wall panel & concrete base support junction detail.



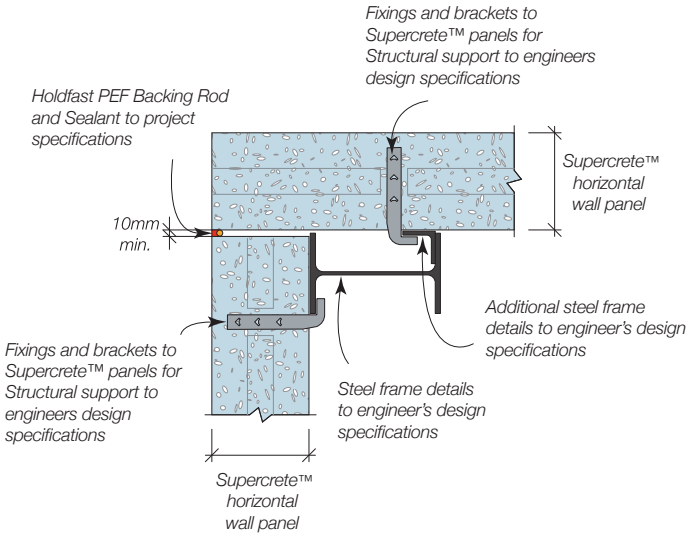
Detail 18.2.2 Horizontal wall panel & steel base angle support junction detail.



Detail 18.2.3 Horizontal wall panels straight line wall junction detail.

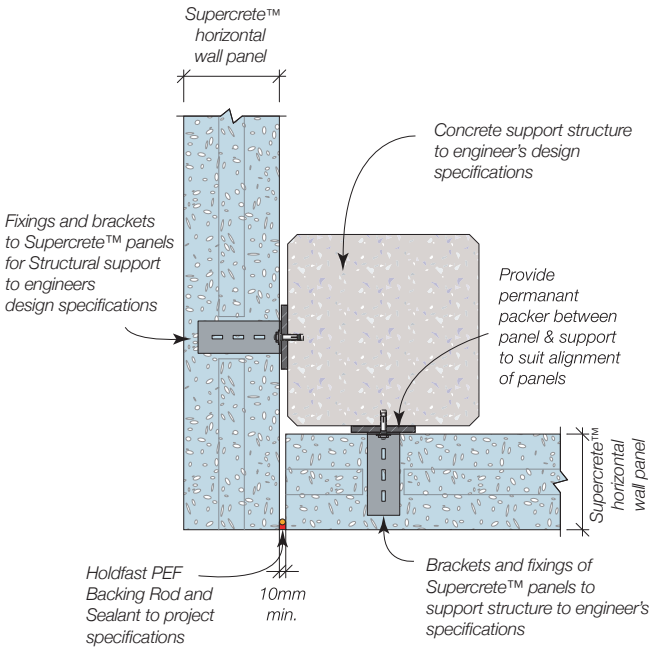


Detail 18.2.4 Horizontal wall panel & steel column support - corner junction detail.

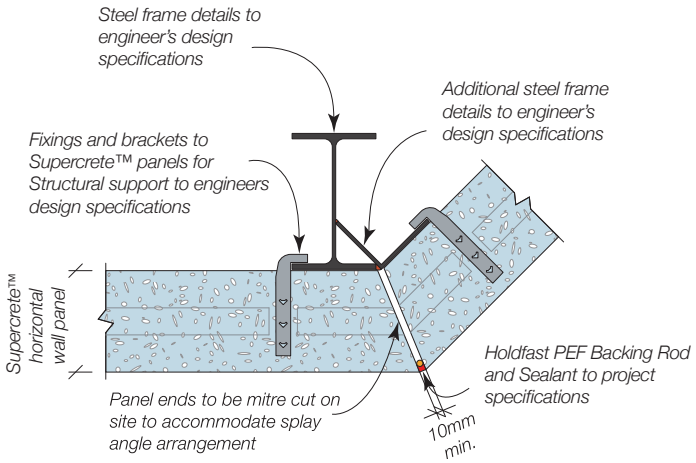


Detail 18.2.5 Horizontal wall panel & concrete support - corner junction detail.

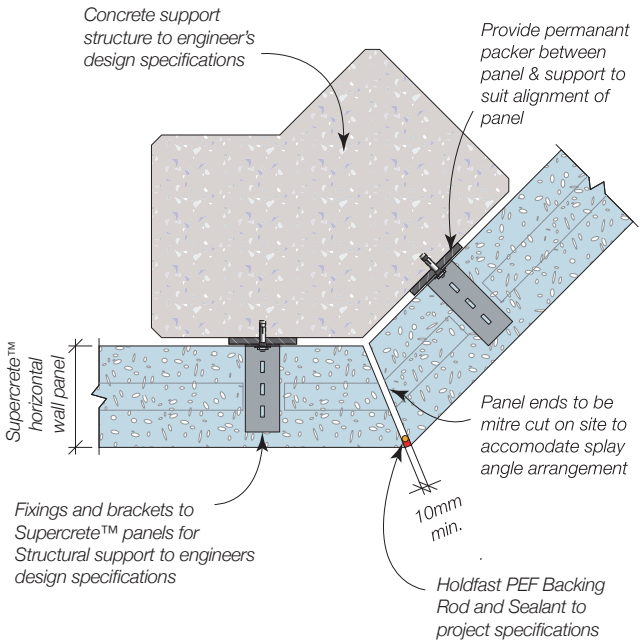
Note: For fire rated wall systems, the packer must have the required fire resistance level, FRL.



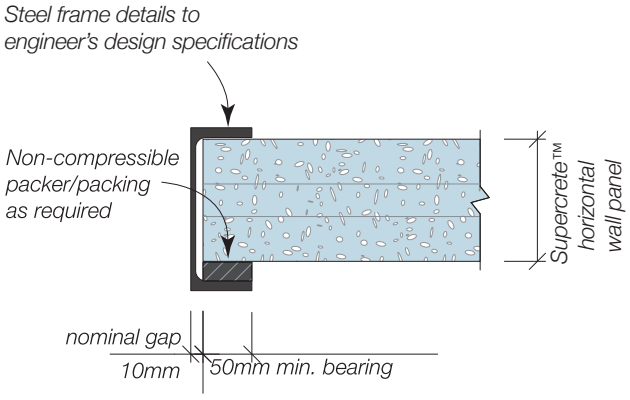
Detail 18.2.6 Horizontal wall panel & steel support - splay corner junction detail.



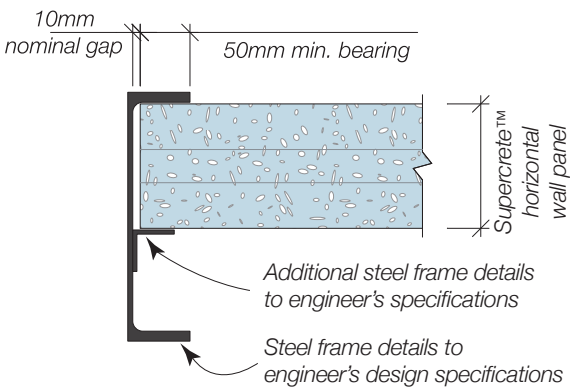
Detail 18.2.7 Horizontal wall panel & concrete support - splay corner junction detail.



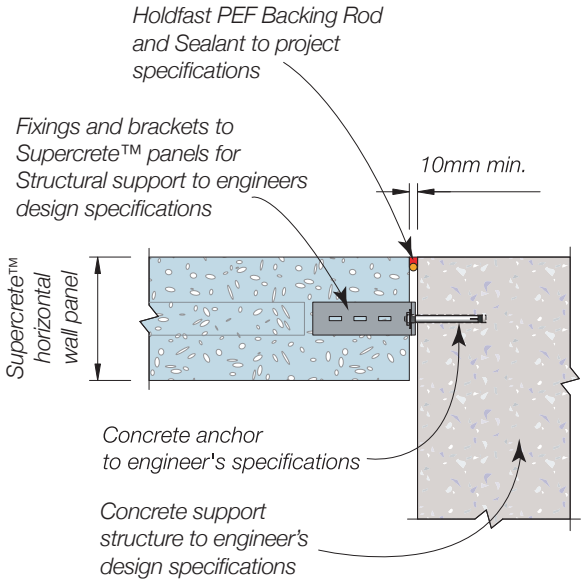
Detail 18.2.8 Horizontal wall panel & steel edge support - panel ends junction detail. Option 1.



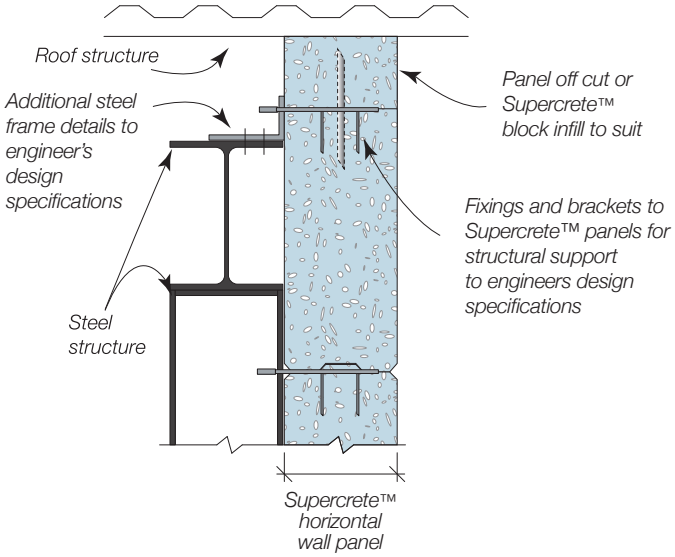
Detail 18.2.9 Horizontal wall panel & steel edge support - panel ends junction detail. Option 2.



Detail 18.2.10 Horizontal wall panel & concrete support - panel ends junction detail.

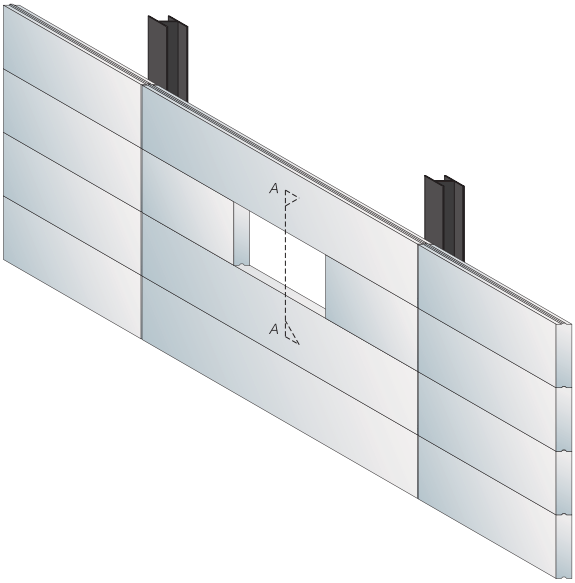


Detail 18.2.11 Horizontal wall panel & roof/top of wall support structure - junction detail.



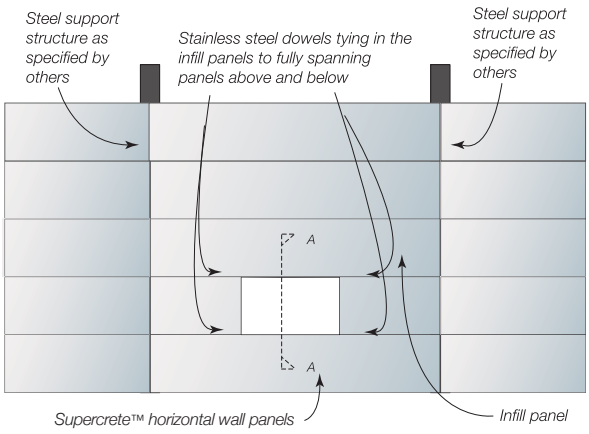
18.3 Horizontal Panels - Opening Details

Detail 18.3.1 Opening within width of Single Panel.



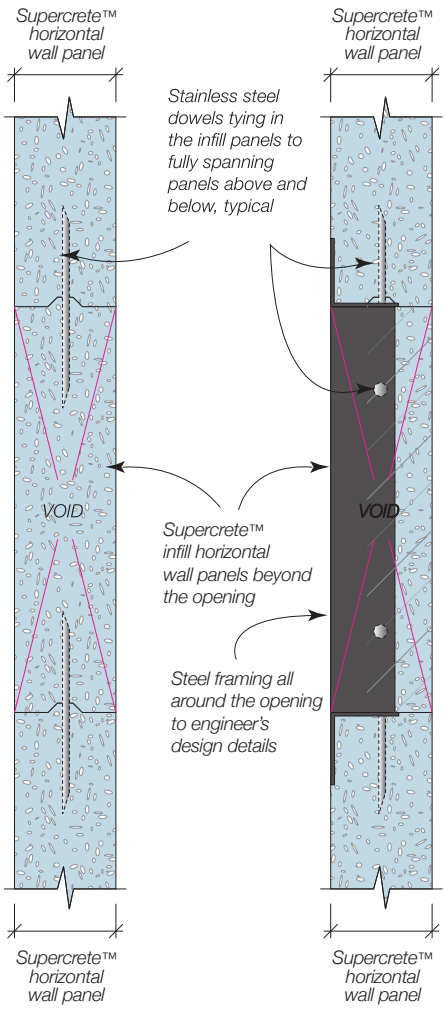
Isometric View

Panels above and below opening to support wind loads shed from opening & infill panels.

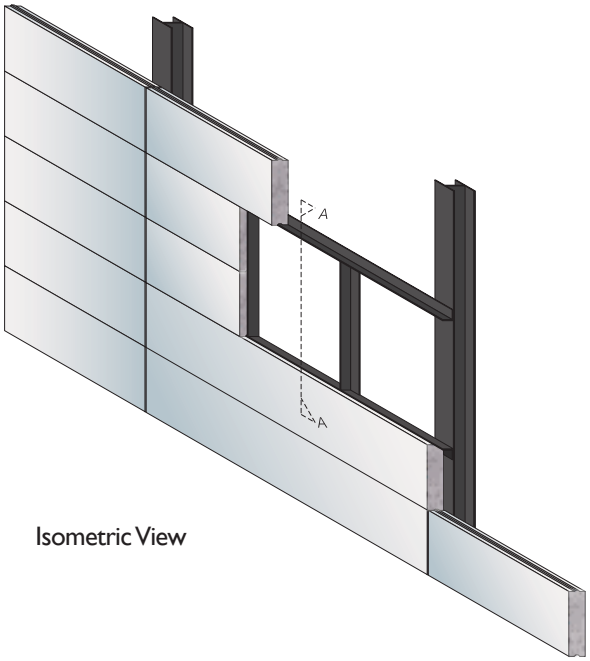


Elevation View

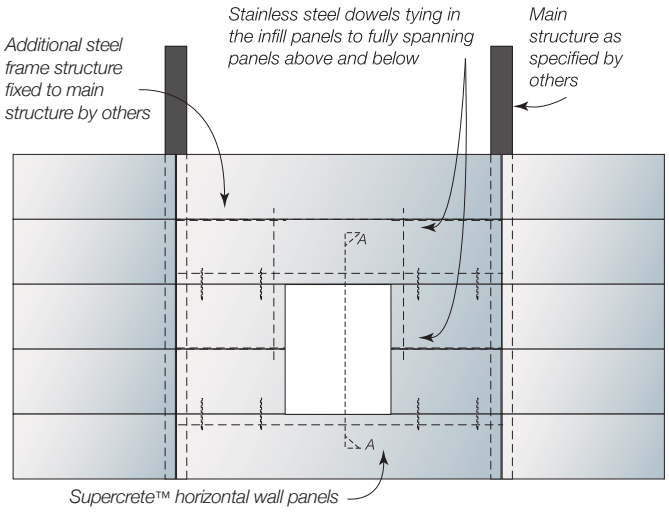
Detail 18.3.2 Section AA - Detail 19.3.1



Detail 18.3.3 Opening over Multiple Panel Widths.

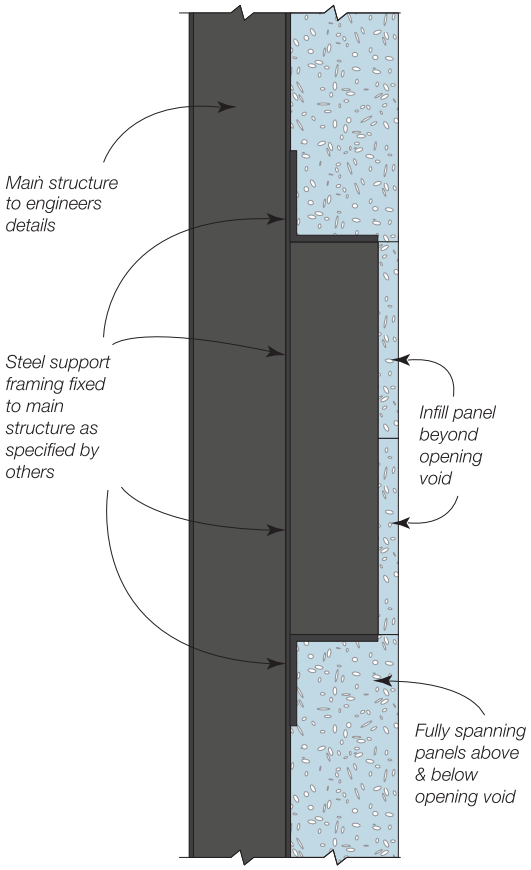


Detail 18.3.4 Elevation of Opening over Multiple Panel Widths.

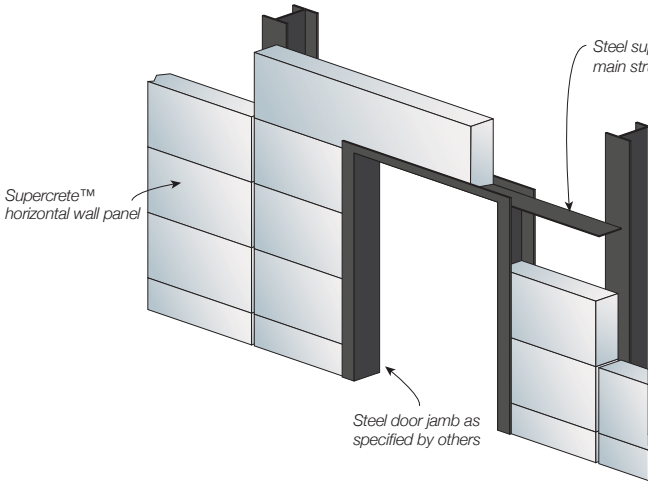


Additional steel support structure is required to transfer loads from opening & infill panels to main structure. Additional steel support structure to be specified by others.

Detail 18.3.5 Section A-A - Detail 19.3.3



Detail 18.3.6 Door opening isometric detail.



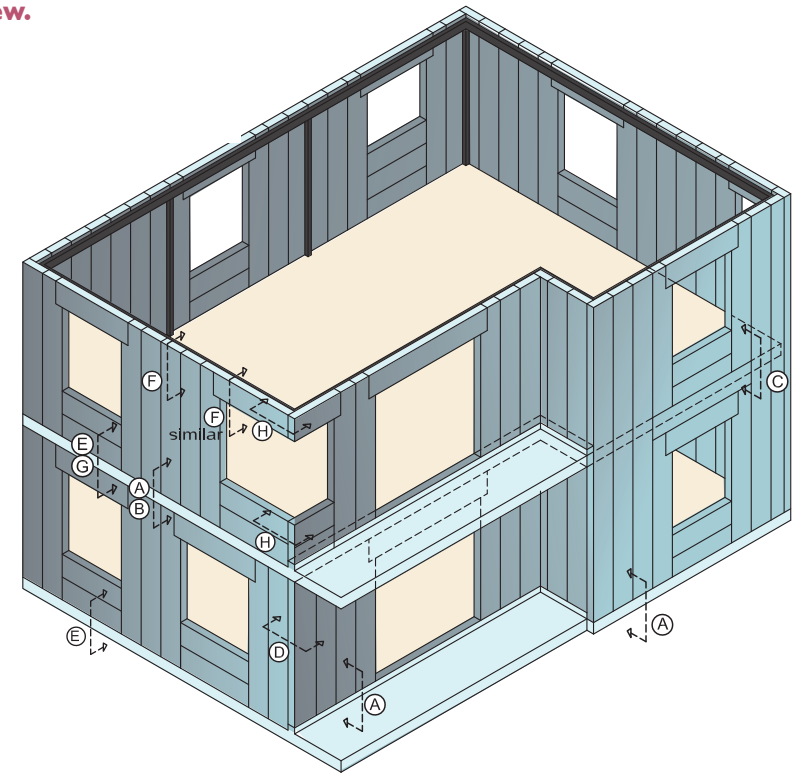
DETAIL 102.2.4 - MULTIPLE PANEL WIDTH OPENING - SAMF
ISOMETRIC DETAIL

19.0 Construction Details - Vertical Panels

19.1 Vertical Panels - Isometric, Plan & Elevation Views

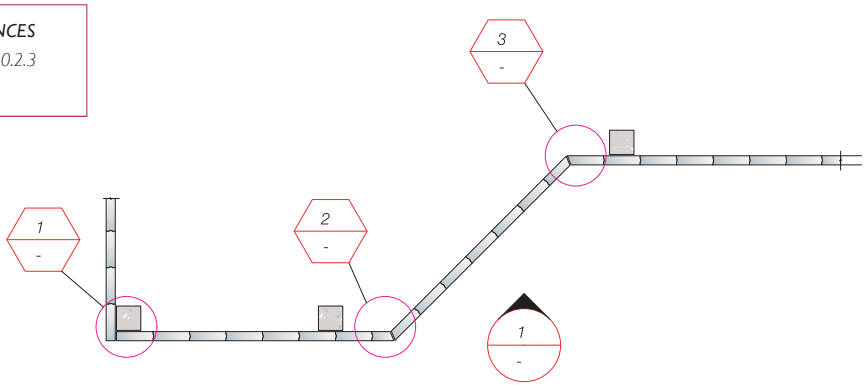
Detail 19.1.1 Isometric view.

SECTION REFERENCES	
A=20.2.1	E=19.2.1
B=20.2.7	F=20.2.8
C=20.2.5	G=18.5.1
D=20.2.2	H=20.2.2



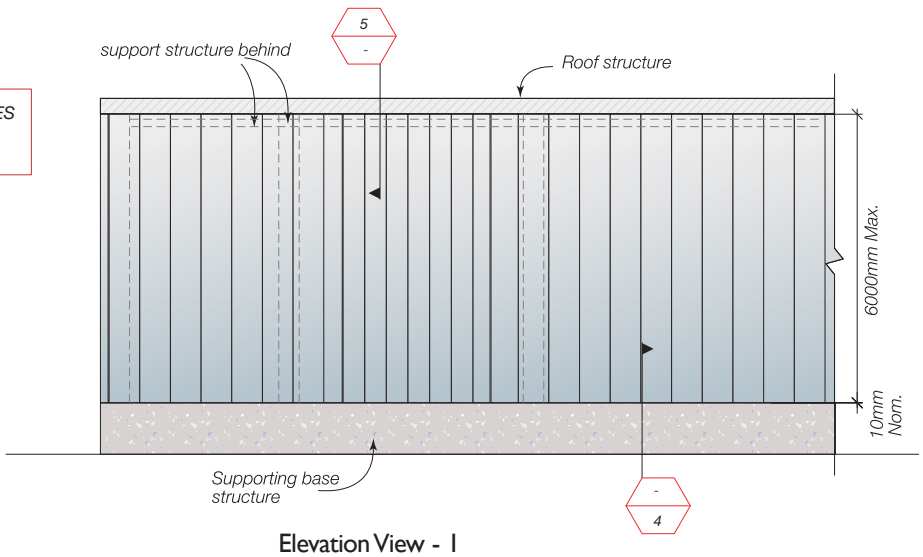
Detail 19.1.2 Plan view and Elevation view.

DETAIL REFERENCES	
1=20.2.2	3=20.2.3
2=20.2.3	



Plan View

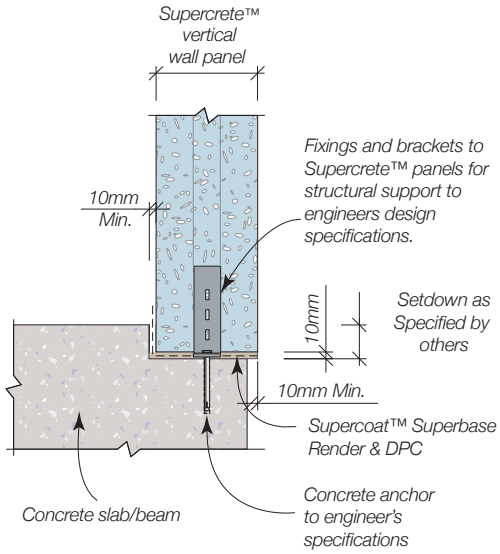
SECTION REFERENCES	
4=20.2.1	5=20.2.8



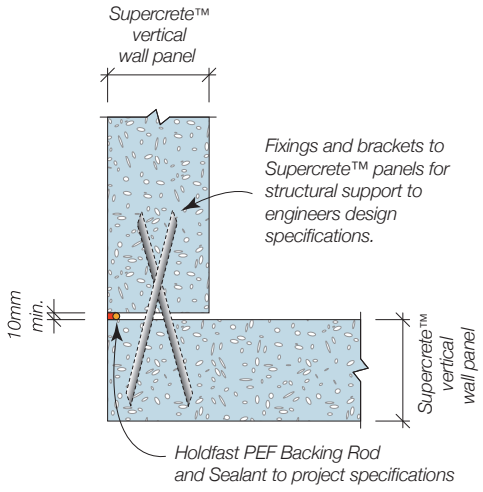
Elevation View - 1

19.2 Vertical Wall Panels - Junction Details

Detail 19.2.1 Vertical wall panel and concrete base support junction detail.

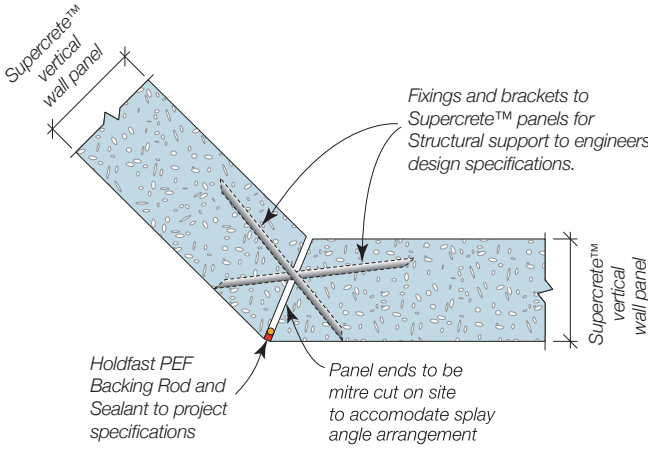


Detail 19.2.2 Vertical wall panel corner junction detail.



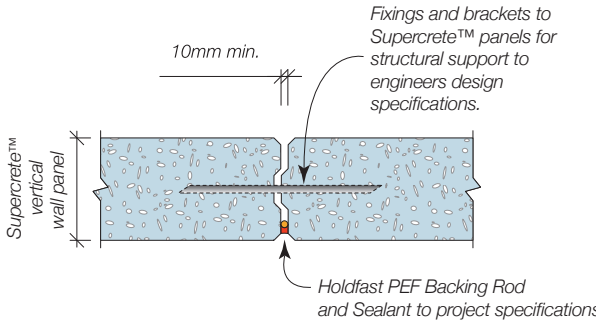
External side

Detail 19.2.3 Vertical wall panel splay corner junction detail.



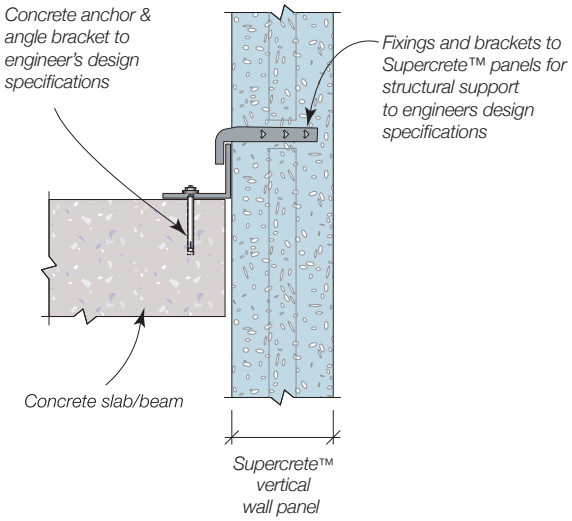
External side

Detail 19.2.4 Vertical wall panel straight line control joint junction detail.

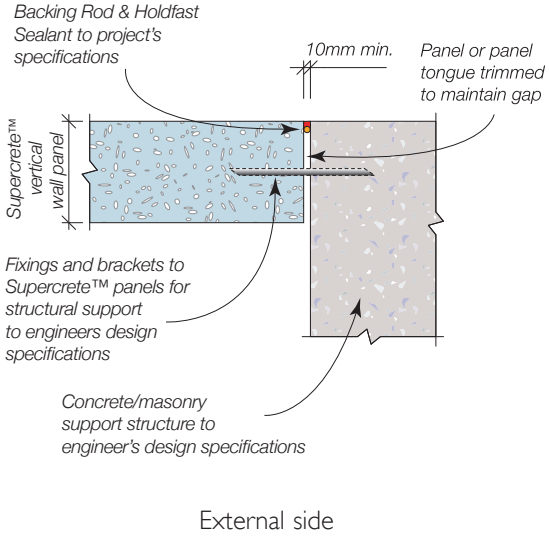


External side

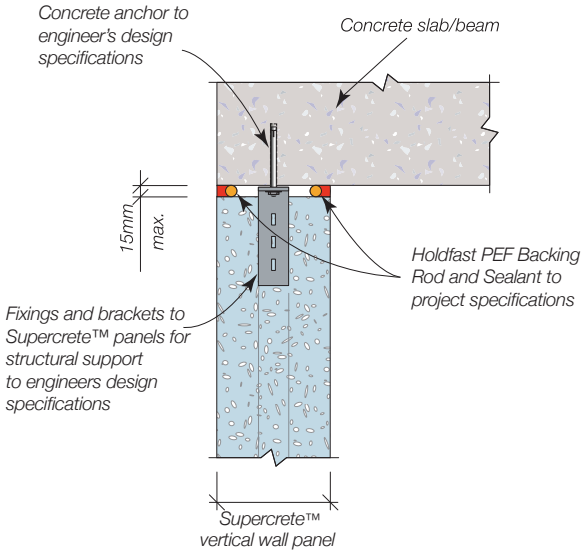
Detail 19.2.5 Vertical wall panel & concrete structure mid wall height junction detail.



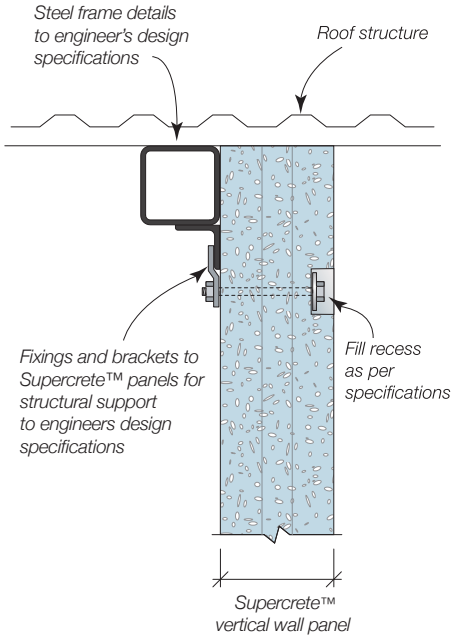
Detail 19.2.6 Vertical wall panel & concrete structure end of wall junction detail.



Detail 19.2.7 Vertical wall panel & concrete support structure top of wall junction detail.

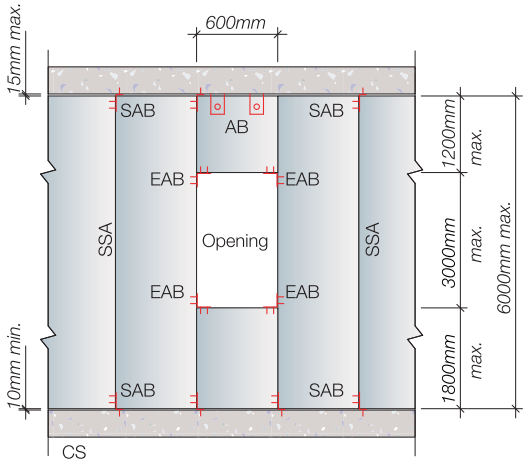


Detail 19.2.8 Vertical wall panel & roof support structure junction detail.

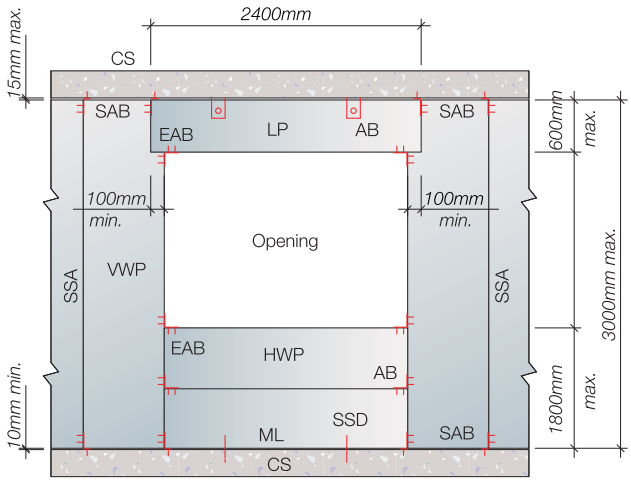


19.3 Vertical Wall Panels - Opening Details

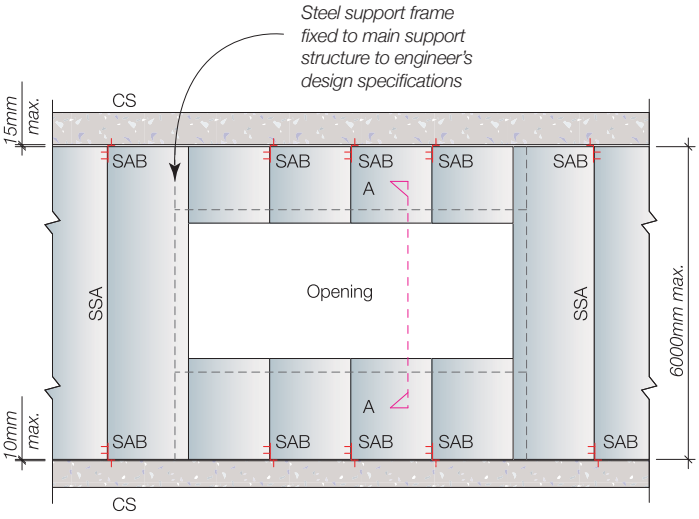
Detail 19.3.1 Single panel width opening detail.



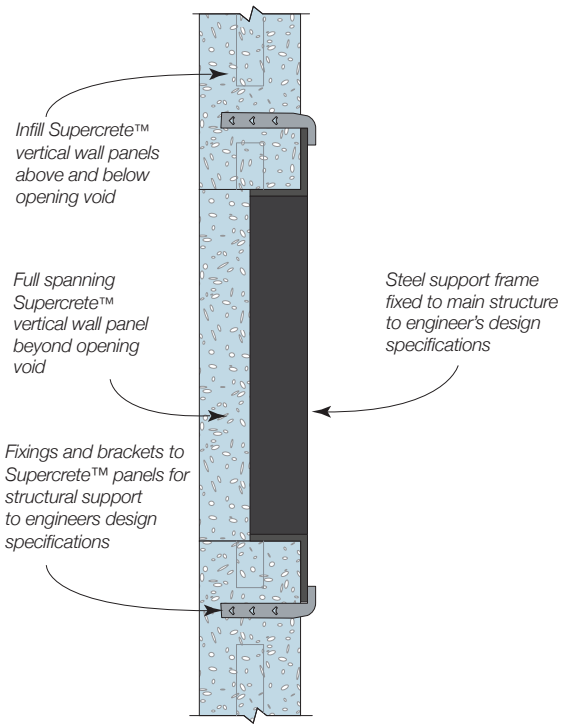
Detail 19.3.2 Opening wider than single panel.



Detail 19.3.3 Opening Across Multiple Panels.



Detail 19.3.4 Multiple panel width opening Section A-A detail.



Legend

AB	=	Angle Bracket to project specifications
BR	=	Backing rod & sealant to project specifications
CS	=	Concrete Support (slab/beam/wall)
EAB	=	Equal Angle Bracket (ex MultiBrace)
SSA	=	Supercoat™ AAC Superbond Adhesive
HWP	=	Supercrete™ Horizontal Wall Panels
ML	=	DPC or equivalent bond breaker & mortar layer
LP	=	Supercrete™ horizontal Lintel Panel
SAB	=	Slotted Angle Bracket
SSD	=	Stainless Steel Dowels
VWP	=	Supercrete™ Vertical Wall Panels

Appendix A
Supercrete™ Wall Panel Material Properties

A.1 Supercrete™ Wall Panel Physical Properties

- For standard and custom Supercrete™ Wall Panel dimensions see Figure 1.1 on page 3.
- Standard panel profile is tongue and groove (T&G), but plain edges are available.
- Panel is reinforced with a double layer of steel mesh.
- Nominal Dry density of AAC = 525kg /m^3
- Average working density of AAC = 682kg/m^3 at 30% moisture content.
- Average working density of panel (AAC + reinforcement) = 718kg/m^3 at 30% moisture content.
- Average service life density of AAC = 578kg/m^3 at 10% moisture content.

A.2 Supercrete™ Wall Panel Strength Properties

- Mean Compressive Strength of AAC = ≥3.5MPa
- Characteristic Modulus of Rupture of AAC, f'_{ut} = 0.60 MPa

A.3 Supercrete™ Wall Panel Fire Resistance Rating (FRR)

For fire performance ratings of Supercrete™ Wall Panel and CIWS walls refer to Section 8.0 of this publication.

A.4 Fire Hazard Indices

Supercrete™ AAC Products have the following early fire hazard indices, determined in accordance with AS/NZ1530.3:1990:

Ignitability Index	0
Spread of Flame Index	0
Heat Development Index	0
Smoke Development Index	0

A.5 Supercrete™ Wall Panel Acoustic Ratings

- For detailed information of acoustic properties for other wall panel thicknesses and CIWS variations please refer to Section 9.0 of this design guide.

A.6 Supercrete™ Wall Panel Thermal Ratings

- For detailed information of thermal properties for other wall panel thicknesses and CIWS variations please refer to Section 10.0 of this design guide.

Appendix B

Checklist for Supercrete™ Commercial and Industrial Wall Systems (CIWS)

IMPORTANT NOTES

- All sections of this checklist must be filled out in full by the tradesperson performing the work.
- Careful compliance with the Supercrete™ CIWS Guide is critically important. All construction shall be in accordance with this installation literature.

PROPERTY DETAILS

Project/Owner Name: _____

Project Address: _____

MAIN CONTRACTOR DETAILS

Builders Name: _____

Company Name: _____

Company Address: _____

Phone: _____ Fax: _____

Mobile: _____ Email: _____

PANEL INSTALLERS DETAILS

Installers Name(s): _____

Supervisors Name (where applicable): _____

Company Name: _____

Company Address: _____

Phone: _____ Fax: _____

Mobile: _____ Email: _____

Pre-installation Structural Requirements

The Supercrete™ Panel Installer must ensure that the following features are present and sign that they are satisfied with the quality.

FOUNDATION

All perimeter footings should be finished as detailed on design documentation and align with this Supercrete™ CIWS Design & Installation Guide. The top surface of this rebate should be smooth and free from lumps, irregularities or blemishes that would prevent the panel from sitting true and flush.

Refer to this Supercrete™ CIWS Design & Installation Guide for acceptable footing configurations. The rebate must be coated with Supercoat™ Tanking Membrane and have a strip of DPC laid on it to allow for shrinkage movement between panel and foundation and prevent moisture uptake.

FOUNDATION REBATE SATISFACTORY **YES ☐**

DAMP PROOF SLIP JOINT INSTALLED **YES ☐** **Signed** _____

Date _____

FRAMING

All structural steel framing must be straight and plumb. Minor misalignment can be corrected by packing behind the panels with a noncompressible packer such as steel or fibre cement. Major frame deviation or misalignment must be corrected by the builder/Main Contractor prior to Supercrete™ CIWS installation. Ensure secondary steel around openings are flush and plumb with primary structural steel portals/ frames. Ensure sufficient fixings to support the Supercrete™ CIWS including bottom fixings and tension ties with V-Nails. Ensure that the minimum edge/end distance noted in Table 6.2 are maintained in all connection situations.

FRAMING STRAIGHT **YES ☐** **PACKED ☐**

FIXING ADEQUACY **YES ☐** **PACKED ☐** **Signed** _____

Date _____

WINDOWS & OPENINGS

All window and door opening must be fully detailed and documented by the project designer to ensure they can be installed effectively with the correct weather proofing design philosophy's and installation techniques.

WINDOW INSTALLATION SATISFACTORY YES ☐

SEALANT/ BACKING INSTALLED **YES ☐** **Signed** _____

Date _____

FLASHINGS

Where Supercrete™ CIWS Panel meets another material of a different cladding system, appropriate flashings should be installed to ensure both systems function as designed. Such areas include the junction of different claddings and where roof planes meet Supercrete™ CIWS walls. Flashings must be present to allow the Supercrete™ CIWS to be sealed from the external environment.

FLASHINGS PRESENT **YES ☐** **Signed** _____

Date _____

MOVEMENT CONTROL JOINTS BETWEEN DIFFERENT CLADDINGS

Where the Supercrete™ CIWS Panel meets an alternate cladding such as fibre cement, timber, brick, EIFS, steel, as well as a flashing between cavity systems, a sealant joint and break in the coating is required to act as a delineated movement joint. Sealants and flashings must be compatible with both cladding systems.

INSTALLED CORRECTLY **YES ☐** **Signed** _____

Date _____

DOOR SILLS

Door sills must not be formed with Supercrete™, as it is susceptible to corner damage in foot traffic applications. Treat the door as for windows in respect of sealants and backings.

DOOR INSTALLATION SATISFACTORY **YES ☐**

SEALANT/ BACKING INSTALLED **YES ☐** **Signed** _____

Date _____

Installation Requirements

WORKING TEMPERATURE

The cement content of the Supercoat™ AAC Superbond Adhesive will not properly hydrate and reach full strength if mixed and applied below 10°C. In temperatures greater than 30°C, it is likely to set too quickly, preventing a positive bond between panels. Supercoat™ AAC Superbond Adhesive work must be carried out between these temperatures.

INSTALLED WITHIN TEMPERATURE RANGE YES ☐ Signed _____

Date _____

PANEL CONDITION

If a panel has minor surface blemishes, such as scratches or flakes missing to a depth of no more than 5mm, this face can be turned toward the building interior, to allow the unblemished face to be exposed. If the panel is badly damaged with flakes or chips exposing the panel reinforcing, it should not be used. Minor damage may be patched with a paste made from Supercoat™ AAC Superbond Adhesive and Supercrete™ dust. Minor edge chips can be filled with Supercoat™ AAC Superbond Adhesive Any reinforcing steel exposed by cutting shall be coated with a thick course of anti-corrosion paint.

PANEL CONDITION SATISFACTORY **YES ☐** **Signed** _____

Date _____

MOVEMENT CONTROL JOINTS

It is critical that the structural movement of the building be allowed for by means of movement control joints. These are to be located on the drawings by the project engineer at panel ends, at corners and at no greater than 6 metre centres on straight runs of wall. Refer to the Supercrete™ CIWS Design & Installation Guide for positioning information. Importantly, the vertical control joints will be typically at the primary structural steel portals, if the Supercrete™ CIWS Panels are installed horizontally. The vertical movement joints will be at nominated centres if the Supercrete™ CIWS Panels are installed in the vertical orientation.

MOVEMENT CONTROL JOINTS INSTALLED YES ☐ **Signed** _____

Date _____

FIXINGS AND BATTENS

The number and spacing of fixings is determined by the Supercrete™ CIWS panel size and design loading calculated by the project designer and engineer in alignment with the information in the Supercrete™ CIWS Design & Installation Guide.

BATTEN & SCREW FIXINGS CORRECT **YES ☐** **Signed** _____

Date _____

COMMENTS

_____

_____

Technical Support

Superbuild International Ltd and its network of Distributors offers technical assistance across New Zealand. Visit www.superbuild.co.nz for your local Distributor who will offer free estimating services; technical support to project architects, engineers, builders and owners.

Health & Safety

Information on any known health risks of our products and how to handle them safely is shown on their package and/or the documentation accompanying them.

Additional information is listed in the Material Safety Data sheet. To obtain a copy, telephone 0800 GO 4 SUPER or visit www.superbuild.co.nz

Guarantee

Supercrete™ Autoclaved Aerated Concrete products and Supercoat™ Coating System products are guaranteed to be free of defect in material and manufacture.

Installation workmanship and coating application work is guaranteed by the personnel who perform this work.

Substitution of this claddings' listed components is not permissible and if alternative brands, materials or elements are used, this will void all guarantees.

This guarantee excludes all other guarantees and liability for consequential damage or losses in connection with defective cladding, other than those imposed by legislation.

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