High-rise External Wall System

HORIZONTAL DESIGN AND INSTALLATION GUIDE

50MM
62MM
75MM

EDITION: JANUARY 2024

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About Nasahi®

FOR THE PAST 20 YEARS NASAHI® HAVE BEEN ONE OF THE WORLD'S LARGEST PRODUCERS OF INNOVATIVE, HIGH QUALITY AAC MATERIALS.

We have become a world leader in the production of revolutionary building materials by investing over USD$60 million in the most technologically advanced processes in the industry. Our production facility has the capacity of 700,000 m^3 of AAC products per year, selling within China and exporting to Japan, Singapore, Malaysia, Vietnam, Philippines, UAE, Maldives, Russia, Angola, Australia, New Zealand etc. Our reputation for consistently producing high quality products is exceptional.

The Nasahi® range of building systems are regularly tested in Australia by NATA accredited laboratories. They are carefully engineered to comply with the requirements of the Building Code of Australia, and to remain at the cutting edge of product innovation.

Nasahi®'s in-house engineers provide project specific guidance, assisting with custom projects and bringing your ideas to life.

With warehouses located in every state of Australia, Nasahi® can easily meet demands and quickly deliver to site.

Our ISO 9001 and JIS A 5416 manufacturing processes are audited annually by independent authorities. This ensures that we meet the needs of our customers and other stakeholders while complying with statutory and regulatory requirements.

By building smarter we provide a guarantee you can trust.

SCOPE

This design and installation guide is intended for use by qualified and experienced architects, engineers and builders for the design, specification and construction of external wall cladding of high-rise residential and commercial buildings. These buildings are assumed to be those within the scope of Class 2-9 buildings as defined in the National Construction Code – Building Code of Australia (NCC) and include residential apartment buildings, hotels, health-care buildings, office buildings, shops and restaurants etc.

Any variation of the system outlined in this manual is considered outside the scope and must be evaluated by all relevant professional consultants.

LIMITATION

This design and installation guide relates specifically to Nasahi® products and must not be used in relation to any other building product. The guide does not replace the need for qualified designers (e.g. engineers & architects) to specify project specific information and it is their responsibility to confirm the suitability of using Nasahi® AAC products and systems for a particular project. Nasahi® accepts no liability for errors or omissions in this design and installation guide and the user must always check the Nasahi® website to ensure the current edition of the manual is being used.

Autoclaved Aerated Concrete (AAC)

AUTOCLAVED AERATED CONCRETE IS A LIGHTWEIGHT PRECAST CONCRETE BUILDING MATERIAL THAT PROVIDES EXCELLENT STRUCTURAL, THERMAL, FIRE, TERMITE AND MOULD-RESISTANCE.

AAC is manufactured from cement, sand, lime and water; it is aerated by adding an expanding agent to the mix. The mix is poured into a large mould and allowed to rise. These large soft blocks are sliced into the required panel sizes and are then cured in a steam pressure autoclave for up to 12 hours.

The result is a concrete panel filled with small, finely dispersed air bubbles, which is both strong and lightweight.

Embedded corrosion protected steel mesh inside the panels provide excellent strength when installed as internal walls or over a load bearing timber or steel frame.

Nasahi® AAC panels comply with the Australian Standard for Reinforced Autoclaved Aerated Concrete for construction (AS 5146.3:2018) with respect to the panels being used in wall applications.

Panels are supplied in a standard width of 600mm and 2200mm length and can easily be cut to size allowing fast and strong installation.

Nasahi® Panels are designed to provide a superior wall cladding solution with the feel of concrete at a significantly reduced cost. Nasahi® Panels have excellent airborne noise transmission properties result in a quieter, more comfortable environment for your family.

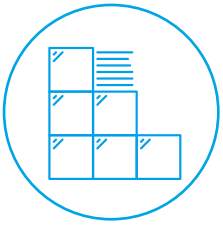
Manufactured from lightweight, reinforced, autoclaved aerated concrete, Nasahi® Panels have a Design (Working) Density of 590 kg/m^3 and a Dry Density of 525 kg/m^3 making them highly resistant to chipping and damage during delivery and handling.

Table 1 - Weights for 2200x600mm Panels

Thickness	50mm	62mm	75mm
Working Panel Weight (590kg/m^3) at 12.4% moisture content	39kg	48kg	58kg

Nasahi® AAC Panels (50mm, 62mm, & 75mm in thickness are supplied with a single layer of steel mesh reinforcement. Nasahi® AAC Panels are tested for strength to AS 5146.3-2018.

Advantages of Nasahi®



QUICK INSTALLATION

3 qualified tradespeople can easily install 50m2 of Nasahi® Panel per day, making it significantly faster and less labour intensive than traditional masonry

TRANSPORTABLE

Panels are flat packed in packs of up to 20 improving transportability to and around site.

FIRE RESISTANT

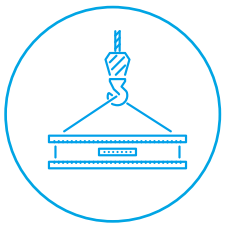
Nasahi® Panels are non-combustible and are compliant as external wall cladding to AS1530.4 Nasahi® Panels have been rigorously tested and will provide an FRL up to -/120/120 using standard 10mm plasterboard internal lining.

THERMAL COMFORT

Nasahi® Systems achieve high thermal ratings and meet the NCC Energy Efficiency requirements for Australian Climate Zones.

QUIET

The Nasahi® Panel's unique aerated construction provides the thermal performance of a lightweight system while delivering excellent acoustic performance like a dense masonry product.



LIGHTWEIGHT AND STRONG

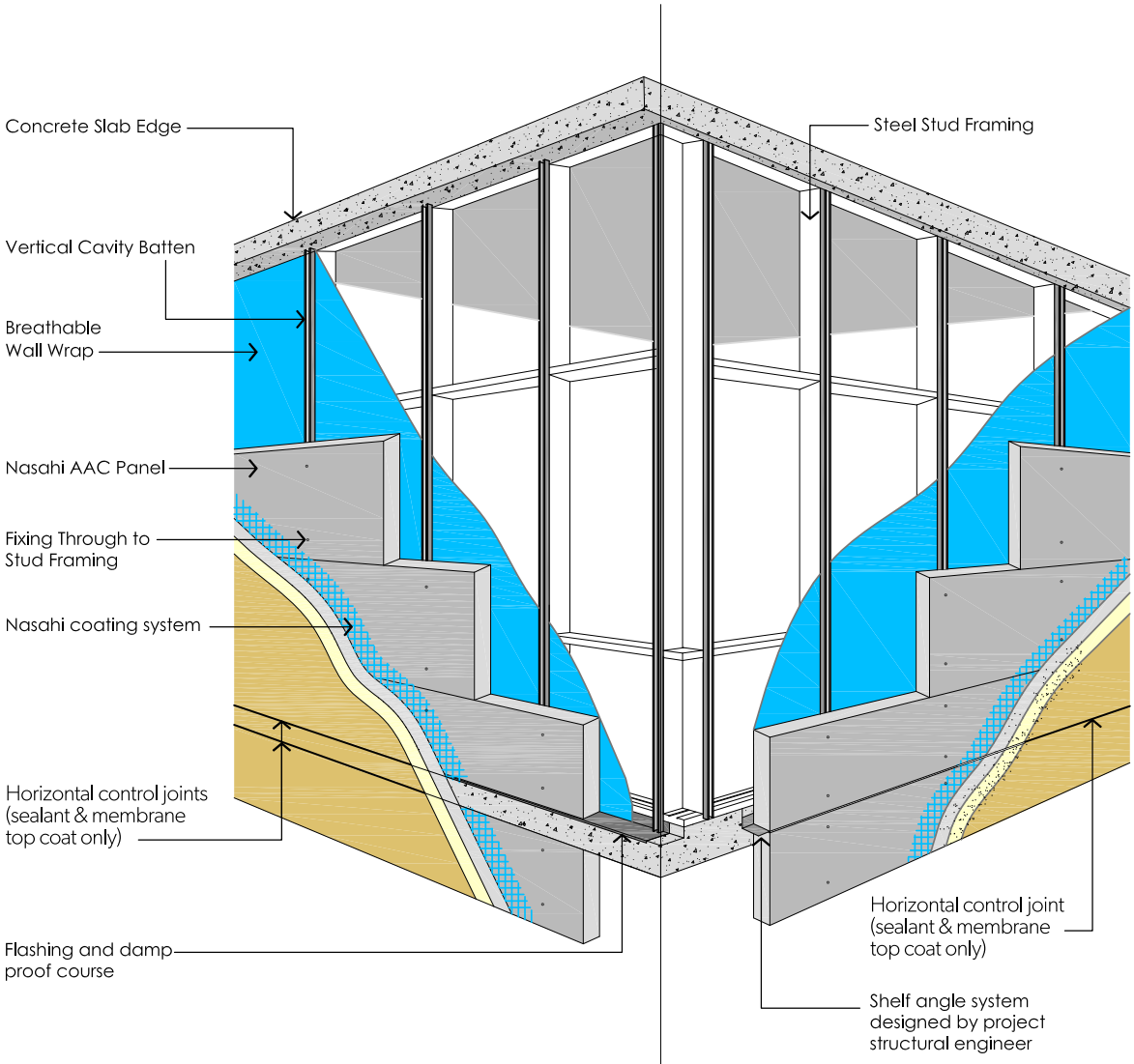
Nasahi® Panels weigh less than standard concrete masonry, making it convenient, lightweight, and easy to work with. Strength is provided by corrosion protected internal steel reinforcing mesh.

Nasahi® AAC Panels can also be used for External Walls 120/120/120, Flooring, Party Walls and Fences (see other Nasahi® Design Manuals for these applications.)

Overview

THE NASAHI® HIGH-RISE EXTERNAL WALL SYSTEM IS A NON-LOAD BEARING VENTILATED CAVITY WALL SYSTEM SUITABLE FOR USE BETWEEN FLOORS OF MULTI-STOREY BUILDINGS.

The system consists of 50, 62 or 75mm Nasahi® AAC panels laid horizontally in a stretcher bond pattern that are screw fixed through steel battens into a steel stud frame. The frame is lined with a breathable wall wrap on the cavity side and typically plasterboard on the inside face while bulk insulation is located between the studs. Once installed, a durable coating system is applied to the external face of the Nasahi® AAC panels then painted.



OPTION A

Panel Supported On Slab Edge

OPTION B

Panel Supported On Shelf Angle

NCC COMPLIANCE

Construction building works in Australia are governed by the National Construction Code of Australia (NCC). It sets out the requirements for buildings and consists of Volume 1 (commercial and medium-large residential buildings) and Volume II (low rise residential buildings). As defined in the scope, this guide relates to the external walls for high rise residential & commercial buildings classified as class 2-9 of the NCC Volume I. The requirements of the NCC that relate to the Nasahi® AAC High-rise external wall system are listed in Table 2 below.

The Nasahi® High-rise External Wall manual satisfies the relevant parts of the 2022 National Construction Code (NCC) – Building Code of Australia (BCA) Volume 1 and has gained CodeMark certification for this – Refer to CodeMark certificate CM40327 on our website www.nasahi.net.au.

Table 2 - NCC Compliance

	VOLUME ONE
Structural	B1P1(1),(2) & B1P2*
Fire	C2D2, C2D10, C2D11, C2D13, C1P1*, C1P2*, C1P4* & C1P8*
Bushfire	G5D3
Weatherproofing & Damp proofing	F3P1 & F1P4
Acoustic	F7P2* & F7P4*
Energy Efficiency	J4D6
Condensation	F8P1

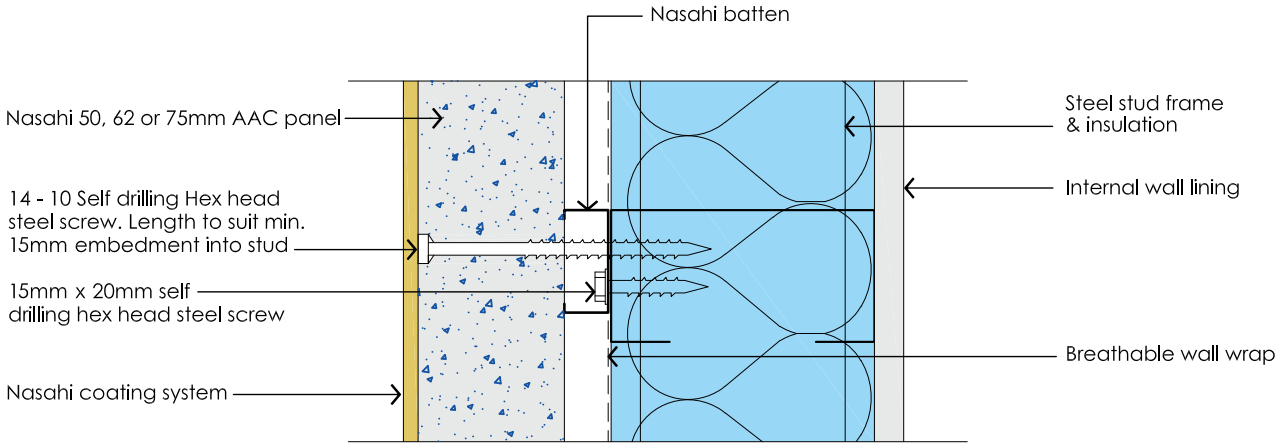
** Note. The NCC compliance claims for B1P2, C1P1, C1P2, C1P4, C1P8, F7P2 & F7P4 are outside of the CodeMark certificate.*

The Nasahi® CodeMark Certificate can be downloaded from our website.

Performance

STRUCTURAL

THE NASAHI® HIGH-RISE EXTERNAL WALL SYSTEM IS A NON-LOAD BEARING WALL SYSTEM THAT IS NOT INTENDED TO RESIST VERTICAL OR IN-PLANE SHEAR LOADS (RACKING FORCES). THE WALL SYSTEM DOES RESIST OUT-OF-PLANE LOADS FROM WIND OR EARTHQUAKE EVENTS. THE OUT-OF-PLANE LOAD IS RESISTED PRIMARILY BY THE STEEL STUD FRAME THAT THE NASAHI® AAC PANELS ARE FIXED TO (REFER TO THE TYPICAL FIXING DIAGRAM BELOW).



Plan View of Typical Fixing Detail

The project structural engineer must ensure that the self-weight of the Nasahi® AAC Panels plus coating is allowed for when undertaking design of the support structure. (e.g. shelf angles and suspended slabs etc.). Designers must use the AAC density for design value – refer to Appendix, Table 1 on Page 39.

The system has been successfully tested for non-cyclonic ultimate limit state wind pressure up to ±5.3 kPa. Table 5 (next page) details the stud and fixing requirements of the wall system for various ultimate and serviceability wind loads. For buildings with higher wind loads or cyclonic wind regions contact Nasahi® for further advice. The stud sizes are provided for guidance only, they must be confirmed by the project structural engineer to include top/bottom tracks, noggings and fixing details.

Table 3 (next page) provides the stud size and panel fixing specification for ultimate limit state and serviceability limit state for non-cyclonic wind loads. This enables the user to easily specify the correct framing and fixing specification for each application. Please note that the wind load around a high-rise building varies and is dependent on the floor height and the proximity to a building corner. It is recommended that Table 3 is used by designers experienced in the determination of wind loads on a high-rise building (eg. structural engineers).

Table 3 – Non-cyclonic wind load stud size and fixing table

ULTIMATE WIND PRESSURE (±kPa)	SERV. WIND PRESSURE (±kPa)	STUD SPACING (mm)	NO. OF FIXINGS PER PANEL AT EACH STUD	WALL HEIGHT (M)				
				2.7	3.0	3.3	3.6	3.9
				ROWS OF NOGGINGS				
				1	1	2	2	2
1.00	0.65	600	2	89 x 0.75mm BMT	89 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
		450	2	76 x 0.75mm BMT	89 x 0.75mm BMT	89 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT
		400	2	76 x 0.75mm BMT	89 x 0.75mm BMT	89 x 0.75mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT
		300	2	76 x 0.75mm BMT	76 x 0.75mm BMT	89 x 0.75mm BMT	89 x 0.75mm BMT	89 x 1.15mm BMT
1.25	0.81	600	2	76 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
		450	2	89 x 0.75mm BMT	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
		400	2	76 x 0.75mm BMT	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
		300	2	76 x 0.75mm BMT	76 x 0.75mm BMT	89 x 0.75mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT
1.50	0.97	600	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		450	2	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
		400	2	89 x 0.75mm BMT	89 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
		300	2	76 x 0.75mm BMT	89 x 0.75mm BMT	89 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT
1.75	1.13	600	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		450	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
		400	2	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
		300	2	89 x 0.75mm BMT	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
2.00	1.29	600	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-	-
		450	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		400	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
		300	2	89 x 0.75mm BMT	89 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT
2.25	1.46	600	2	150 x 1.15mm BMT	-	-	-	-
		450	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		400	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		300	2	76 x 1.15mm BMT	89 x 1.15mm BMT	150 x 0.75mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
2.50	1.62	600	2	150 x 1.15mm BMT	-	-	-	-
		450	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-	-
		400	2	150 x 0.75mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
		300	2	76 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT
3.00	1.65	450	2	150 x 1.15mm BMT	-	-	-	-
		400	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-	-
		300	2	89 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
3.50	1.65	450	2	150 x 1.15mm BMT	-	-	-	-
		400	2	150 x 1.15mm BMT	-	-	-	-
		300	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-
4.00	1.65	400	2	150 x 1.15mm BMT	-	-	-	-
		300	2	150 x 1.15mm BMT	150 x 1.15mm BMT	150 x 1.15mm BMT	-	-

Reference Document: Venn Engineering, Report No. VE-NAS-2007141A, Dated14th July 2020.

Notes to Table:

1. Wind loads shall be determined using AS/NZS 1170.2-2021

2. Steel studs are assumed to be G2 with a minimum yield stress (fy) of 270 MPa and Ultimate strength of 330 MPa.

3. Stud framing to have 1 row of noggings located at mid height for stud heights up to 3000 and 2 rows equally spaced for stud heights up to 3900mm.

4. Top and bottom tracks of similar size to the studs shall also be provided in accordance with the manufacturer's specification.

5. Fixing of the stud, tracks, noggings and anchorage to the concrete slabs shall be the responsibility of the project structural engineer.

6. The above table limits the wall deflection to span/250 for the purposes of limiting cracking to the AAC panels of less than 1mm. The external coating is required to be capable of bridging up to 1mm crack in the substrate as per clause 2.8.4(c) of AS 5146.3:2018

7. The above table limits Design Serviceability Limit State wind pressure to 1.65kPa based on tested weatherproofing performance, see page 15.

DURABILITY

AAC products have been used in the building industry worldwide for several decades and continues to be recognised for their performance, particularly durability.

Since the introduction of AAC over 30 years ago the product has a proven record as a durable material in the Australian environment. The most important aspect affecting durability in Nasahi® panels is the coating system that is applied (refer to External Coating requirements on pages 16 & 17). When subjected to typical conditions, the Nasahi® External wall system will provide many years of maintenance free service. The exposure environment for a particular building site shall be determined in accordance with AS 5146-2018 parts 1 or 2. The Nasahi® High-rise External Wall system is suitable for all exposure zones up to and including severe marine. For building sites in industrial exposure environments contact Nasahi® for further information.

In accordance with AS 3566.2 Class 3 fasteners must be used for moderate and mild exposure environment. Class 4 for severe marine further than 100m from breaking surf, marine and industrial exposure environments. Class 4 stainless steel for severe marine exposure environments within 100m of breaking surf.

WEATHERPROOFING

The weatherproofing of the Nasahi® High-rise External Wall system has been successfully tested in accordance with the NCC Volume 1 verification method FRV1.

It is suitable to be used for buildings with:

- A serviceability limit state wind load of up to ±1.65 kPa
- A total risk score of up to 20 (see F3V1 of 2022 NCC Volume 1)

For buildings with higher wind loads contact Nasahi® for further advice.

The Nasahi® External Wall System has been developed for framed construction in line with the principles of pressure equalisation. Pressure equalisation refers to the wall cavity being allowed to experience the same pressure as that acting on the external side of the wall.

A critical part of the system to create pressure equalisation is the breathable wall wrap which must be completely sealed using tapes on the joints and around the periphery to become an air barrier. Hence, the sealing and installation of the breathable wall wrap must be undertaken with care and adequate supervision. Consideration of all the breathable wall wrap joints and interfaces with other building materials shall be the responsibility of the project engineer. Refer to Page 32 for additional information.

External Coating Systems

EXTERNAL COATINGS

The selected external coating must provide weatherproofing and durability in accordance with the NCC requirements. Nasahi® approves coating systems that achieve the performance levels outlined in Table 4 below and Clause 2.8.4 of AS 5146.3. Nasahi® have provided an example of a coating system on the next page that achieves compliance with these requirements. It is the responsibility of the building designer to select a suitable system, and for the installer to ensure these specifications are met, complete an Installation Compliance Certificate, and submit copies to both the builder and Nasahi®.

Table 4 - Coating Performance Level

TEST	PERFORMANCE REQUIREMENT	UNIT
Water Transmission Resistance	< 10	$g/m^2/24hr/1kPa$
Water Vapour Permeability	w. sd ≤ 0.2	$kg/(m^2.h^{0.5})$
Co-efficient of Water Absorption	w ≤ 0.5	$kg/(m^2.h^{0.5})$
Equivalent Air Layer Thickness of Water Vapour Diffusion	sd ≤ 2	m
Durability	Minimum 7-year warranty	
Elasticity	Bridge a minimum crack width of 1mm	

Note: A co-efficient of water absorption (w ≤0.5) means that minimal water is absorbed regardless of time period. A Coating with Sd ≥ 2m has less resistance to water vapour diffusion (escape) than a static 2m thick layer of air.

SURFACE PREPARATION

Before applying the coating system, the applicator must hose down the wall with fresh potable water, ensure that all required penetrations and fire collars have been correctly installed and Nasahi® Panels are dry and clean of debris/oil. Surface protrusions must be trimmed back, and large imperfections filled with Nasahi® Panel Adhesive. Exposed reinforcing bars must be coated with Nasahi® Corrosion Protection Touch up Paint. AAC substrate shall be allowed to reach equilibrium moisture content prior to application of coating.

RECOMMENDED COATING SYSTEM

Nasahi® recommends the following system be used on External Walls as it has been shown to meet the approved coating specification.

Table 5 - Recommended Coating System

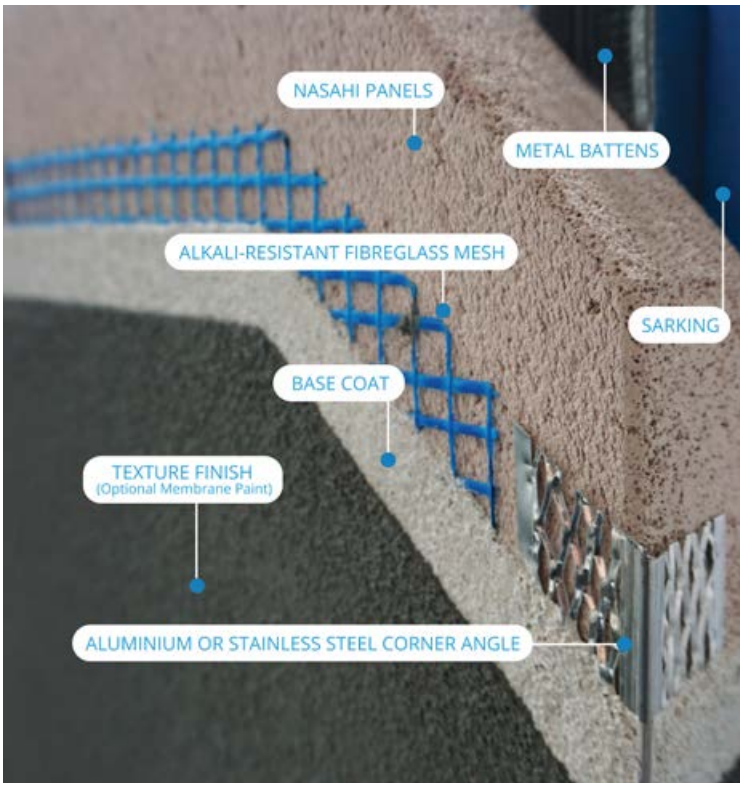
APPLICATION TO	RECOMMENDATION
External Corner Angles	32mm x 32mm Aluminium, PVC or Stainless-Steel corner angles.
Primer Coat (to manufacturer specifications)	Primer/Sealer to enhance adhesion (if required by coating manufacturer)
Base Coat Render*	High build acrylic, Portland cement-based render with thickness of 2-6mm. This base coat must encapsulate the reinforcing mesh.
Reinforcing Mesh*	165g/m2 Alkali resistant fiberglass mesh with minimum aperture 5mm square embedded into the base coat render.
Texture Coat*	Cement based polymer modified dry powder or wet pre-mixed full acrylic texture coating with minimum thickness 1mm applied with trowel or float over base coat.
Paint System	A minimum of two coats of 100% acrylic-based exterior paint should be applied to a thickness of 150um per coat, and have crack bridging capability of 5 times the total dry film thickness. Note. Must be used in marine exposure environments as per AS4654.1.

** These components of the coating system are required as per AS5146.3.*

TYPE A AND B NON-COMBUSTIBLE CONSTRUCTION

As per Clause C2D10(4)(0) of the NCC 2022, the above external coating system is suitable to be used in Type A and B non-combustible construction and the Nasahi® wall system arrangement complies with the Performance Requirement C191 and C1P2* of the NCC.

*Note: The NCC compliance claim for C1P2 are outside of the CodeMark certificate.



Fire Resistance

THE NASAHI® EXTERNAL WALL SYSTEM HAS BEEN DESIGNED TO COMPLY WITH FIRE RESISTANCE REQUIREMENTS OF THE NCC.

Nasahi® Panels are inherently non-combustible, but in the event of fire Nasahi® Panels do not emit any toxic gases or vapours.

The Fire Resistance Level (FRL) of the Nasahi® High-rise External Wall system has been tested and assessed in accordance with AS 1530.4 to provide an FRL of 120/120/120 for a wall height of up to 3m.

Table 6 - External Wall Fire Resistance Levels (FRL)

REQUIREMENT FOR EXTERNAL WALLS					
EXPOSED SIDE CLADDING	**BATTEN***	**WALL FRAMING**	**UNEXPOSED SIDE CLADDING**	**FRL**	**IMPOSED FIRE DESIGN LOAD (AS/NZS 1170.0 CLAUSE 4.2.4)**
Min. 50mm thick Nasahi Panel	Steel batten	Min. 70mm deep timber or min. 76mm deep steel stud	10mm thick or greater standard grade plasterboard	120/120/120	4.94kN/stud

** Refer System Components Page 26 for batten options.*

Table 6A - Nasahi® External Wall – FRL from both sides

CONSTRUCTION ARRANGEMENT FROM OUTSIDE TO INSIDE	FRL FROM OUTSIDE	INTERNAL LINING/ PLASTERBOARD*	FRL FROM INSIDE
• Nasahi® Panel (50mm, 62mm or 75mm) • Steel battens • Min 76mm deep steel stud wall framing • Internal plasterboard*	120/120/120	10mm standard plasterboard	--/--/--
		1 x 13mm Fire Rated plasterboard	30/30/30
		1 x 16mm Fire Rated plasterboard	60/60/60
		2 x 13mm Fire Rated plasterboard	90/90/90
		3 x 13mm Fire Rated plasterboard	120/120/120
• Nasahi® Panel (50mm, 62mm or 75mm) • Steel battens • Min.76mm deep steel stud wall framing • Internal Lining*	120/120/120	Nasahi® Panel (50mm, 62mm or 75mm)	120/120/120

Note: For exposure from internal (plasterboard) side: The stud spacing must not exceed 450mm. Steel Stud BMT must not be less than 0.75 mm.

Reference Documents (Tabes 6 & 6A):

1. Warringtonfire Australia, Fire Assessment Report No. 38259000 R6.4, Dated 22nd August 2023.

TYPE A AND B NON-COMBUSTIBLE CONSTRUCTION

Clause C2D10 of NCC 2022 Volume 1 requires all external wall components must be non-combustible in accordance with AS 1530.1 except for gaskets, caulking, sealants, damp-proof courses, and plasterboard.

All Nasahi® External Wall System components (lining, framing, wrap, sealant, fasteners, coating, and other accessories) have been assessed and are suitable for use in Type A and B non-combustible construction.

The assessment has demonstrated that compliance with the relevant Performance Requirements (C1P1*, C1P2*, C1P4*, C1P8* and E2P2) is achieved by the Nasahi® external wall systems incorporating the products identified above, subject to the following recommendations:

- External systems shall be installed in accordance with the Nasahi® external wall system installation guideline.
- Internal lining shall be non-combustible when tested in accordance with AS1530.1.
- Steel framing is acceptable when installed as per the Nasahi® external wall installation guide.
- Timber framing is acceptable when installed as per the Nasahi® external wall installation guide, and in accordance with the NCC C2D13 fire protected timber concession.
- Breathable Wall Wrap shall have a maximum thickness of 1 mm and that a test report to AS1530.2 shall be provided by the manufacturer to prove the maximum flammability index of 5.
- Waterproof membranes must not extend throughout between two compartments.
- Sealants shall be sufficiently fire-graded to be compatible with the fire resistance of the wall.
- Insulation shall be non-combustible when tested in accordance with AS1530.1.
- Insulation must not extend throughout between two compartments.
- Paint other than nitro-cellulose lacquer is acceptable to be used in an external wall system.
- Adhesive layer shall not exceed 3mm in thickness. The use of the Nasahi® proprietary panel adhesive is recommended.
- Fixings, screws, fasteners, brackets and angles shall be made of steel.
- Flashings and external corner angles shall be made of steel.
- Cavities in external wall must be fire stopped, using cavity barriers and fire sealant to Fire Engineers specification.
- Cavity barriers shall be non-combustible and have a fire resistance equivalent to that required in fire walls and floors.
- Gaps shall be sealed with fire rated sealant.
- External corner angles shall be made of stainless steel or aluminium. Use of PVC is possible, but a case-by-case assessment is required.
- The control joints and weep holes must not be larger than necessary for their purpose.

It should be noted that compliance of a building with the Performance Requirements C1P1*, C1P2*, C1P4*, C1P8* and E2P2 will be subject to a number of other requirements independent of the external wall system.

The Nasahi External coating system may be used in Type A and B construction. The Coating system (Aluminium, Fibreglass embedded in render, Water, Cement) does not reduce the fire resistance of Nasahi External Wall system and satisfies Performance requirements C1P2* (Spread of fire), C1P4* (safe conditions for evacuation), E2P2 (Safe evacuation routes).

Table 6B - The table below outlines an evaluation of the combustibility of the components of the Nasahi® External wall system.

SYSTEM COMPONENT	COMBUSTIBILITY COMPLIANCE
INTERNAL LINING	
• To project requirements. • For example. 10mm standard plasterboard, 13mm Fire rated plasterboard, 16mm fire rated plasterboard.	**Non-combustible** when tested to AS1530.1. Complies with NCC Clause C2D10. Performance Requirements C1P2* (spread of fire), C1P4* (safe conditions for evacuation), E2P2 (safe evacuation routes) are met.
FRAMING SYSTEM	
• Timber Stud	**Combustible.** However Timber framing is acceptable when installed as per the Nasahi® external wall installation guide, and in accordance with the NCC C2D13 fire protected timber concession. Performance requirements C1P1* is met.
• Steel Stud	**Non-Combustible** (Component is constructed out of steel).
BREATHABLE WALL WRAP (WATERPROOF MEMBRANE)	
• Pliable wall membrane in accordance with AS/NZS 4200.1 with water barrier and vapour permeable classification.	**Combustible.** However, complies with NCC Clause C2D10. It is required that waterproof membrane has a maximum thickness of 1 mm and that a test report to AS1530.2 is provided by the manufacturer to prove the maximum flammability index of 5. Waterproof membranes must not extend throughout between two compartments. Cavities in external walls must be fire stopped, using cavity barriers and fire sealant. Performance Requirements C1P2* (spread of fire), C1P4* (safe conditions for evacuation), E2P2 (safe evacuation routes) are satisfied.
CAVITY BATTENS	
• Steel Cavity Battens	**Non-Combustible** (Component is constructed out of steel).
NASAHI® AAC PANELS	
• 50mm Nasahi AAC Panel • 62mm Nasahi AAC Panel • 75mm Nasahi AAC Panel	**Non-Combustible** when tested to AS1530.1. Acceptable for Type A and B constructions when installed aper the Nasahi® External wall installation guide.
FASTENERS	
• Batten Screws • Panel Screws	**Non-Combustible** (Component is constructed out of steel).
CAULKING – SEALANTS AND BACKING RODS	

Reference Document: TC Fire Engineering, TCFE0011 Fire Safety Report (Issue 4), Dated 7th July 2021.

continued next page >

Table 6B - continued

SYSTEM COMPONENT	COMBUSTIBILITY COMPLIANCE
• Backing Rod • Flexible Sealant • Fire rated Sealant	**Combustibility unknown.** Although the non-combustibility requirement does not apply to sealants and backing rods, sealants are to be sufficiently rated to be compatible with the fire resistance of the wall. It has been demonstrated that backing rods do not reduce the fire resistance of an external wall.
OTHER ACCESSORIES	
• Damp Proof course	**Combustible.** As per C1.10 (C) the requirements for Type A and B construction does not apply to DPC.
• Isolated Construction packers and shims	**Combustibility unknown.** Complies with NCC Clause C2D10(4)(i). (safe evacuation routes) are satisfied.
• Insulation	**Non-Combustible .** All insulation in type A and B buildings shall be non-combustible when tested in accordance with AS1530.1.
• Nasahi® Adhesive	**Non-Combustible.** C2D11 fire hazard properties, and C2D14 ancillary elements requirements do not apply to a material used for an adhesive.
• Nasahi® Anti-Corrosion Paint	**Combustibility is unknown.** Complies with NCC clauses C2D11 fire hazard properties, and C2D14 where ancillary elements requirements do not apply to a paint, paint, varnish, lacquer, or similar finish, other than nitro-cellulose lacquer.
• Steel Pressure equalisation slots • Shelf Angle • Z' flashing	**Non-combustible.** (Component is constructed out of steel).
EXTERNAL COATING (RENDER) SYSTEM	
• Recommended Nasahi® External Wall Coating System • Unitex Acrylic Coating System • Astex Acrylic Coating system • Dulux AcraTex Render Wall AAC Coating System • Rockcote Acrylic Coating system • Ezycoat AAC Render System	**Combustibility unknown.** The recommended coating system do not contribute to a fire (aluminium, fibreglass embedded in render, water, cement). The recommended coating system does not reduce the fire resistance of the Nasahi® wall systems. Performance Requirements C1P2* (spread of fire), C1P4* (safe conditions for evacuation), E2P2 (safe evacuation routes) are satisfied.
PAINT SYSTEM	
• Acrylic based exterior paint	**Non-combustible.** Acrylic paints are water based and as such non-combustible. Furthermore, C2D11 fire hazard properties, and C2D14 ancillary elements requirements do not apply to a paint, varnish, lacquer, or similar finish, other than nitro-cellulose lacquer. Paints other than nitro-cellulose lacquer are acceptable to be used in an external wall system.

Reference Document: TC Fire Engineering, TCFE0011 Fire Safety Report (Issue 4), Dated 7th July 2021.

*Note: The NCC compliance claims for C1P1, C1P2, C1P4 & C1P8 are outside of the CodeMark certificate.

ENERGY EFFICIENCY

The thermal performance of the Nasahi® High-rise External Wall System has been determined in accordance with AS/NZS 4859.1. The table below lists the thermal performance for various systems.

Table 7 - Thermal performance of wall systems

SYSTEM DESCRIPTION	BULK INSULATION	ALL WALL (BRIDGED)			
		TOTAL R, m²·K/W		TOTAL U, m²·K/W	
		WINTER	SUMMER	WINTER	SUMMER
BARE 50mm NASAHI® PANEL (4% M.C.) SYSTEM	None	R0.39	R0.39		
50mm NASAHI® PANEL (4% M.C.) SYSTEM 16mm batten cavity Steel studs@600 cts. 10mm plasterboard internal lining	None	R1.39*	R1.35*	U0.72*	U0.74*
	R2.00	R2.24	R2.13	U0.45	U0.47
	R2.50	R2.48	R2.38	U0.40	U0.42
	R3.00	R2.69	R2.61	U0.37	U0.38
BARE 62mm NASAHI® PANEL (4% M.C.) SYSTEM	None	R0.48	R0.48		
62mm NASAHI® PANEL (4% M.C.) SYSTEM 16mm batten cavity Steel studs@600 cts. 10mm plasterboard internal lining	None	R1.49*	R1.46*	U0.67*	U0.68*
	R2.00	R2.38	R2.26	U0.42	U0.44
	R2.50	R2.63	R2.52	U0.38	U0.40
	R3.00	R2.85	R2.77	U0.35	U0.36
BARE 75mm NASAHI® PANEL (4% M.C.) SYSTEM	None	R0.59	R0.59		
75mm NASAHI® PANEL (4% M.C.) SYSTEM 16mm batten cavity Steel studs@600 cts. 10mm plasterboard internal lining	None	R1.59*	R1.56*	U0.63*	U0.64*
	R2.00	R2.51	R2.39	U0.40	U0.42
	R2.50	R2.78	R2.61	U0.36	U0.38
	R3.00	R3.02	R2.93	U0.33	U0.34

Notes:

1. 24mm or 35mm battens will give similar results.

*2. *Reflective air space into stud frame.*

Reference Document: James M Fricker, Report No. i449_Dmx/s, Dated 25th April 2020.

Condensation Management

IN ORDER TO COMPLY WITH THE NEW CONDENSATION REQUIREMENTS IN THE NCC 2022, NASAHI® HAS APPOINTED FABRIC FIRST TO UNDERTAKE HYGROTHERMAL ASSESSMENT ON OUR NASAHI® EXTERNAL SYSTEMS.

To address condensation performance, and as required by F8D3, Nasahi® Hi-Rise External Wall System, incorporates a vapour permeable pliable building membrane in accordance with AS/NZS 4200.1:2017, installed in accordance with AS 4200.2:2017, on the external side of the primary insulation layer.

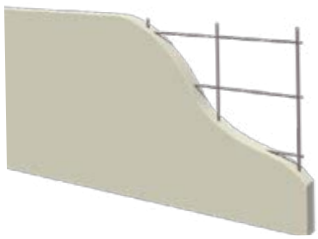
Hygrothermal modelling has been undertaken to determine the risks associated with water vapor and potential condensation to minimise their impact on health of occupants. This has included carrying out assessments on a typical dwelling home of 312.5m3 or 125m2 for Climate zones 1,2,3,5,6 and 7.

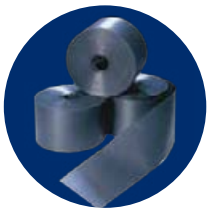
No risk levels were determined, and the External wall systems satisfy condensation management requirements.

Reference Document: Fabric First, Hydrothermal Assessment No. FF0100 (02), Dated 20th November 2020.

System Components

System Components for Steel Frame





NASAHI® PANELS

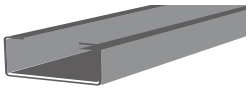
Nasahi® Panels are manufactured from Autoclaved Aerated Concrete (AAC), embedded with coated steel reinforcing mesh, in a standard thickness of 50, 62 and 75mm and width of 600mm and up to 3300mm length.

DPC

Damp-Proof Courses must comply with AS2904, and be installed in accordance with NCC requirements.

METAL FRAME

Steel stud framing shall be designed in accordance with AS/NZS 4600:2018.



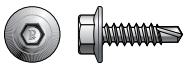
METAL BATTENS

TYPE	FLANGE HEIGHT	MAX WIDTH	MIN. BMT
16mm Galv. Batten	16mm	35mm	0.45mm
24mm Galv. Batten	24mm	45mm	0.50mm
35mm Galv. Batten	35mm	51mm	0.55mm

Note: The steel cavity batten must be of minimum galvanised steel grade G300 with Z180 coating. For type A & B non-combustible construction only steel battens can be used.

SHELF ANGLE & FASTENERS

Shelf angle as per project engineers specification requirement. Shelf angle shall comply with AS/NZS2966.3-2002. Appropriate shelf angle fasteners as per panel thickness and to project engineers design.



PANEL FASTENERS

14-10 - Hex Head Self-Drilling Class 3 Screws Panel fasteners must penetrate through the cavity battens, and into the wall frame by a minimum of 15mm for metal frames.

BATTEN FASTENERS

10-16 x 20mm Hex Head Self-Drilling Class 3 Screws

Note: In accordance with AS 3566.2 Class 3 fasteners must be used for moderate and mild exposure environment. Class 4 for severe marine further than 100m from breaking surf, marine and industrial exposure environments. Class 4 stainless steel for severe marine exposure environments within 100m of breaking surf.

FLEXIBLE SEALANT

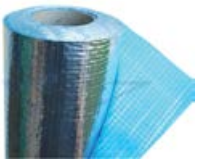
An external grade polyurethane sealant must be used. It is recommended to always use Bostik Seal 'N' Flex 1.

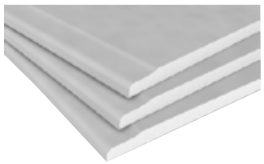
FIRERATED SEALANT

Where fire rating of the wall is required, a fire rated sealant must be used at all control joints throughout the fire rated wall.

WATERPROOF FLEXIBLE TAPE

It is recommended to use waterproof flexible tape for sealing of wall membrane to other substrates and penetrations. Where non-combustible components are required use aluminium foil tape with a maximum total thickness of 1.0mm.





BREATHABLE WALL WRAP

The breathable wall wrap in accordance with AS/NZS 4200.1 & AS 4200.2 that is 1.0mm maximum in thickness and has a flammability Index not greater than 5.

INSULATION

Provide wall insulation between each stud to achieve the required R-Value, refer to the thermal values section of these technical notes. Use non-combustible insulation where non-combustible construction is required.

PLASTERBOARD

Plasterboard shall be either 10 mm standard grade (min. 6.4 kg/m²) or 13 mm fire-rated grade (min. 8.4 kg/m²).

ADHESIVE

Nasahi® Adhesive comes in 20kg bags and is used to glue and seal panel joints, and to fill screw heads.

PRESSURE EQUALISATION SLOTS

Pressure equalisation slots are used to create a pressure equalised facade system to allow wind pressure into the cavity space. When non-combustible construction is required either create a slot in the fire rated caulking or use stainless steel slots.

TOUCH-UP PAINT

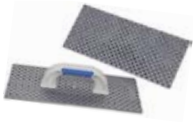
If Nasahi® Panels are cut to size, all exposed reinforcing steel must be treated with Nasahi® Corrosion Protection Touch-up Paint in accordance with the instructions on the container.

Tools Required

NASAHI® PANELS CAN EASILY BE CUT TO THE REQUIRED LENGTH, USING POWER OR HAND TOOLS.

Nasahi® Panels are delivered to site flat packed. The flat packs can be used as a cutting bench for other panels as required. Any reinforcement exposed during cutting must be coated with Nasahi® Corrosion Protection Touch up Paint.

Table 8 - Basic Tools required to Cut and Install Nasahi® Panels

TOOL	USE	
SAW (WITH DIAMOND BLADE)	for cutting panels	
IMPACT DRIVER	for installation of panel fasteners	
DRILL	for drilling penetration holes	
VACUUM	for dust extraction purposes while cutting Nasahi® panels (Class M or H industrial vacuum).	
MIXING DRILL /MIXING BUCKETS	mixing Adhesive and render.	
HAWK AND STEEL TROWEL	for Spreading Adhesive and Rendering.	
RASP (SANDING FLOAT)	for Panel sanding where required	

Design Process

THIS SECTION OUTLINES THE DESIGN PROCESS THAT SHOULD BE FOLLOWED WHEN DETERMINING THE NASAHI® HIGH-RISE EXTERNAL WALL SYSTEM DESIGN APPROPRIATE FOR YOUR PROJECT.

STEP 1

Determine the design wind load pressures in accordance with AS/NZS 1170.2-2021 (R2016) for both ultimate and serviceability limit states.

STEP 2

Determine the steel stud size, spacing and panel fixing requirements using Table 3 in the structural performance section of this guide using the ultimate and serviceability limit state wind pressures and wall heights.

STEP 3

Determine the fire resistance level requirement from the 2022 NCC Volume 1 and confirm it is satisfied with the fire performance outlined in this guide.

STEP 4

Determine what type of construction is required for fire purposes (eg. non-combustible) from the NCC and select the appropriate wall system components.

STEP 5

Confirm the serviceability limit state wind pressure does not exceed the performance outlined in the weatherproofing performance section of this guide.

STEP 6

Determine the energy efficiency R-Value requirement from the 2022 NCC Volume 1 or other local government requirement and select the appropriate system components using Table 7 of this guide.

STEP 7

Determine the exposure environment category in accordance with AS 5146:2018 and select the appropriate wall system components on Page 26 and 27 in this design and installation guide.

STEP 8

Determine the quantities of all components.

Detailing Considerations

WALL PANEL LAYOUT

Construction should be designed for panels in 275mm horizontal modules. This will help minimise the number of panels required during construction and reduce the likelihood of cutting through the embedded corrosion protected steel mesh.

A minimum of two transverse reinforcing bars are required near the ends of each installed panel to ensure the longitudinal reinforcement has enough anchorage. Panels without this will be significantly weaker. Steel reinforcing mesh layout can be seen in Appendix Table 2 on Page 41.

JOINTS

Panel joints

All panel joints, except for control joint locations and intersections with building materials other than AAC panels, should consist of a 2-3mm joint that is completely filled with Nasahi® panel adhesive. Refer to the installation guide for construction guidance.

Control Joints

Cracking in the rendered finish of a reinforced AAC external wall system is generally caused by movement of the various building materials or the overall structure. To minimise the risk of cracking occurring, control joints shall be installed to allow the movement to occur at the control joint instead of in the panel which results in cracking.

Control joints shall be a minimum of 10mm wide and consist of external grade polyurethane flexible sealant (fire rated where required) with a backing rod to control the joint depth refer to construction Detail 6.1 on page 47.

All control joints shall be specified by the design engineer for each project. General guidelines are provided below but it is the design engineer's responsibility to provide project specific documentation of control joints.

Vertical control joints

- At all corner intersections or at a maximum of 2.4m from both sides of the corner
- At centres not exceeding 6m
- At the position where wall height changes
- At a change in thickness of a wall
- At the junctions of walls constructed of different materials
- At control joints or construction joints in the concrete slabs above or below
- Along one of the vertical edges of an opening that larger than 600 mm x 600 mm for the full height of the AAC panel wall
- Along both vertical edges of an opening that is larger than 2000 mm long

Horizontal control joints

- At centres not exceeding 6m
- At each inter-storey junction

PENETRATIONS

Services should be run through the stud framing, not installed in the wall cavity. Where services penetrate through the AAC wall panel, a 5-10mm gap should be created around the service through the AAC panel. Gaps must be filled with backing rod and an appropriate flexible sealant (fire rated where specified) – Refer to construction Details 9.1 and 9.2 Page 50. A fire rated penetration collar may be required around the service and penetration, check with the project's fire engineer.

Penetrations through the breathable wall wrap shall be completely sealed using waterproof tape that is compatible with the breathable wall wrap.

FIXING

All Nasahi® Panels shall be fixed to the stud framing using either 2 or 3 fixing per panel at each stud as shown by the diagrams below. The minimum edge distance for fixing Nasahi® panel shall be 50 mm. Fixings shall not be installed in rebated or chamfered edges of Nasahi® AAC Panel.

Figure 1 - Fixing diagram for 2 screws per panel at each stud

600MM STUD CENTRES

Refer Table 5 for Fixings on Page 13

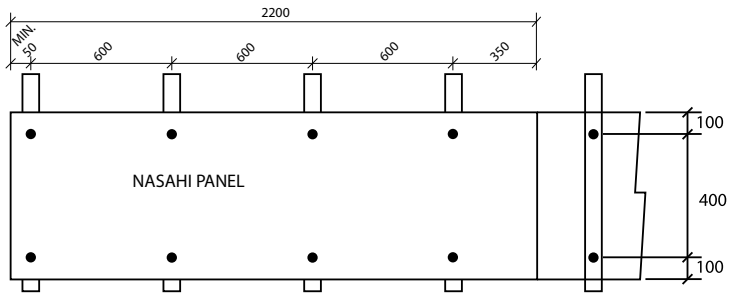
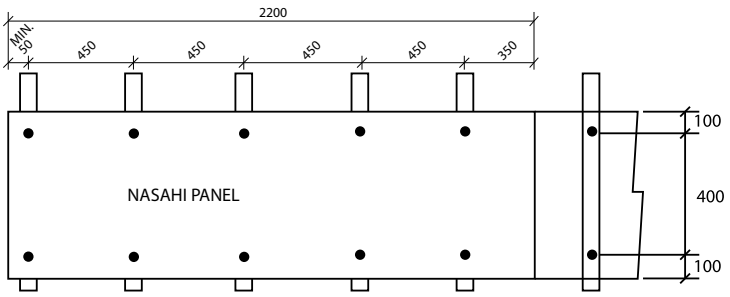


Figure 2 – Screw Fixing diagram per panel at each stud

450MM STUD CENTRES

Refer Table 5 for Fixings on Page 13



BREATHABLE WALL WRAP

The breathable wall wrap that is located between the stud framing and the cavity battens acts as an air barrier for the external wall system which is critical to creating a pressure equalisation and maintaining the weathertightness of the system. The breathable wall wrap is required to be sealed which is achieved using specific tapes for the wall membrane lap joints and at the periphery of the wall to the building materials. Compatibility of the tape with the breathable wall wrap and building material at the wall's periphery must be confirmed prior to installation.

When installing the various components of the wall system, installers must be very careful to not damage the breathable wall wrap. Any punctures in the breathable wall wrap must be repaired using sealing tape.

Breathable wall wraps shall comply with AS/NZS 4200.1 and for type A & B fire construction shall be 1.0mm maximum in thickness and have a flammability index not greater than 5. Installation shall generally be in accordance with AS4200.2:2017 along with the sealing described above.

PRESSURE EQUALISATION SLOTS

The pressure equalisation slots shall be provided in all applications of the Nasahi® AAC external wall for high-rise buildings.

They shall be located at the base of the wall on each floor except for where there is an adjacent balcony where there is potential for the pressure equalisation slot to be covered by the tile bed and tiling. In this instance, the pressure equalisation slot shall be located at the top of the wall for that floor. The pressure equalisation slots shall be:

- 50mm min. high x 10mm wide x the panel thickness deep;
- Cut into the Nasahi® AAC panel prior to being installed; and
- Formed into the caulking; and
- Spaced at a distance not greater than 2200mm;

It is essential that during the application of the render coating, the pressure equalisation slots are not blocked. Clean out of the pressure equalisation slots should be undertaken after completion of the coating and paint finishes.

SHELF ANGLE

Where the Nasahi® AAC panels are supported by a shelf angle system, this shall be designed by the project structural engineer. The designer shall use the AAC panel for design (refer to Appendix, Table 1) and account for the render coating on the panels.

Installation Sequence

PRIOR TO COMMENCEMENT OF CONSTRUCTION

I) Ensure stud spacings meet the wind pressure requirements of the project using Table 3 on Page 13.

ii) Panels must be screwed to meet wind load requirements as per Table 3 on Page 13.

iii) Ensure that the appropriate size screw is selected dependent on Panel thickness and batten size, refer to System Components on Page 26.

STAGE 1: PREPARING FOR PANEL INSTALLATION

a) The frame must be completed prior to installation of the Nasahi® panels (A pre-installation checklist is available on our website).

b) DPC or waterproof membrane must be installed on slab up stand in accordance with NCC requirements.

c) Use a straight edge to ensure framing is straight with particular attention to corner studs that they are straight and plumb.

d) Install breathable wall wrap in accordance with the manufacturer's instructions ensuring that all joints are sealed using tape at lap joints, wall periphery, interface with other building materials, wall openings and penetrations.

STAGE 2: BATTEN INSTALLATION

a) Attach battens vertically to each stud.

b) Flashings must be installed around penetrations in accordance with the project design engineer's details. Guidance is provided in the construction details.

c) Allow for control joints as specified by the design engineer.

STAGE 3: NASAHI® PANEL INSTALLATION

a) Starting at a corner, rest the panel on the slab rebate or the designed shelf angle; push the panel horizontally hard up against the battens;

b) Use a spirit level to ensure that the Nasahi® Panel is level and either flush or overhanging the slab edge rebate.

c) Screw fix through the exterior face of the Nasahi® Panel through the batten and into the frame.

d) Fixings must comply with Table 3 on Page 13. Screws must be a minimum of 100mm from the panel edge.

e) Screw head must embed 5 to 10mm into the panel face.

f) If panels are misaligned, back blocking with a metal section fixed to the panels with screws is allowed. Back blocking is required for aesthetic reason only, so panels are aligned and flush. See Detail 7.3 on Page 48.

STAGE 4: PANEL ADHESIVE

a) Apply approximately 2 to 3mm thick panel Adhesive to vertical edge of the panel. Install the next panel against it; ensuring it is level and joint is fully sealed.

b) Screw fix as per Stage 3: c)

c) Repeat around the perimeter of the building.

d) Apply 2 to 3mm thick Panel Adhesive to the horizontal top edge of the panel.

e) In a stretcher bond pattern, lay the next row of panels with a minimum of 275mm overlap of the Nasahi® Panel below; then screw fix as outlined above ensuring it is level and joins are fully sealed. Remove excess adhesive that has squeezed out of the joint.

f) Where the joint is a construction (control) joint leave 10mm nominal gap and the edges of the panel must be clean.

g) If panels are cut to length; ALL exposed steel reinforcement must be treated with Nasahi® Anti Corrosion Touch Up Paint.

h) Penetrations and Services must be sealed in accordance with Plumbing and Electrical section below;

i) Prepare the adhesive with the instructions on the bag.

j) Upon project completion; the installer and renderer must both complete a Nasahi® Installation Compliance Certificate and submit to both the builder and Nasahi® for the warranty to be valid.

PLUMBING AND ELECTRICAL

a) Services if any are preferred to be installed through the frame where possible;

b) Penetrations for services should be neatly cut/drilled and any clearance gap should be sealed with an approved sealant;

c) PVC Sheathed electrical cables must be prevented from direct contact with battens;

d) No channels (chasing) are to be cut in the panels for services;

e) If planed and appropriately sealed full openings (e.g. recessed power meter box) can be cut.

Delivery & Handling

DELIVERY

- Nasahi® Panels are delivered to site in flat packs of up to 20. (Refer to Table 9)
- Each pack has a wet mass of approximately 960kg, including packaging.
- Panel packs must only be stacked one pack high and must be properly supported on level ground.
- If packs are to be placed on any type of structure, always consult the project engineer to verify the structural adequacy of the structure.
- Nasahi® Panels should be stored on a level surface and never more than one pack high.

Table 9 - Panel Packs and weight

ALL PANELS ARE FLAT PACKED		
THICKNESS	NO. OF PANELS	APPROX. WEIGHT PER PACK
50mm	20	960kg
62mm	15	
75mm	13	

MANUAL HANDLING

To reduce the likelihood of damage, handling of Nasahi® Panels around site should be kept to a minimum. When lifting a panel, turn onto its long edge and support the weight by lifting with two people as shown below. Before lifting panels, a manual handling risk assessment must be performed to ensure personal injury risk is minimised. Packs should be unloaded as close as possible to the installation area; however, where this is not possible Nasahi® recommends the use of trolleys and/or other mechanical devices.

DO NOT Carry Nasahi® Panels FLAT

ALWAYS Carry Nasahi® Panels ON EDGE

Health & Safety

HEALTH AND SAFETY

All quarry products, including bricks, concrete and Nasahi® Panels contain Crystalline Silica, or Silica Dust. Prolonged exposure to Silica Dust without the correct PPE can be harmful and potentially cause skin irritation and life-threatening health hazards such as bronchitis, silicosis and lung cancer.

Silica dust is generated when cutting, drilling or moving the panels.

The site should be cleaned of dust regularly and when using power tools these should be fitted with an efficient, well-maintained dust extraction system.

Nasahi® recommends the use of Class M or H industrial vacuum systems for dust extraction. These vacuums suitably capture the dust and also allow for disposal of the waste in a manner to minimise dust exposure.

Nasahi® Panels do not contain any additives that are known to cause health problems; however, because of the risk of exposure to Silica Dust it is recommended that the correct PPE is worn.

The Nasahi® High-rise External Wall System Installer is responsible for informing all employees of these Health and Safety requirements under the Occupational Health and Safety Act.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

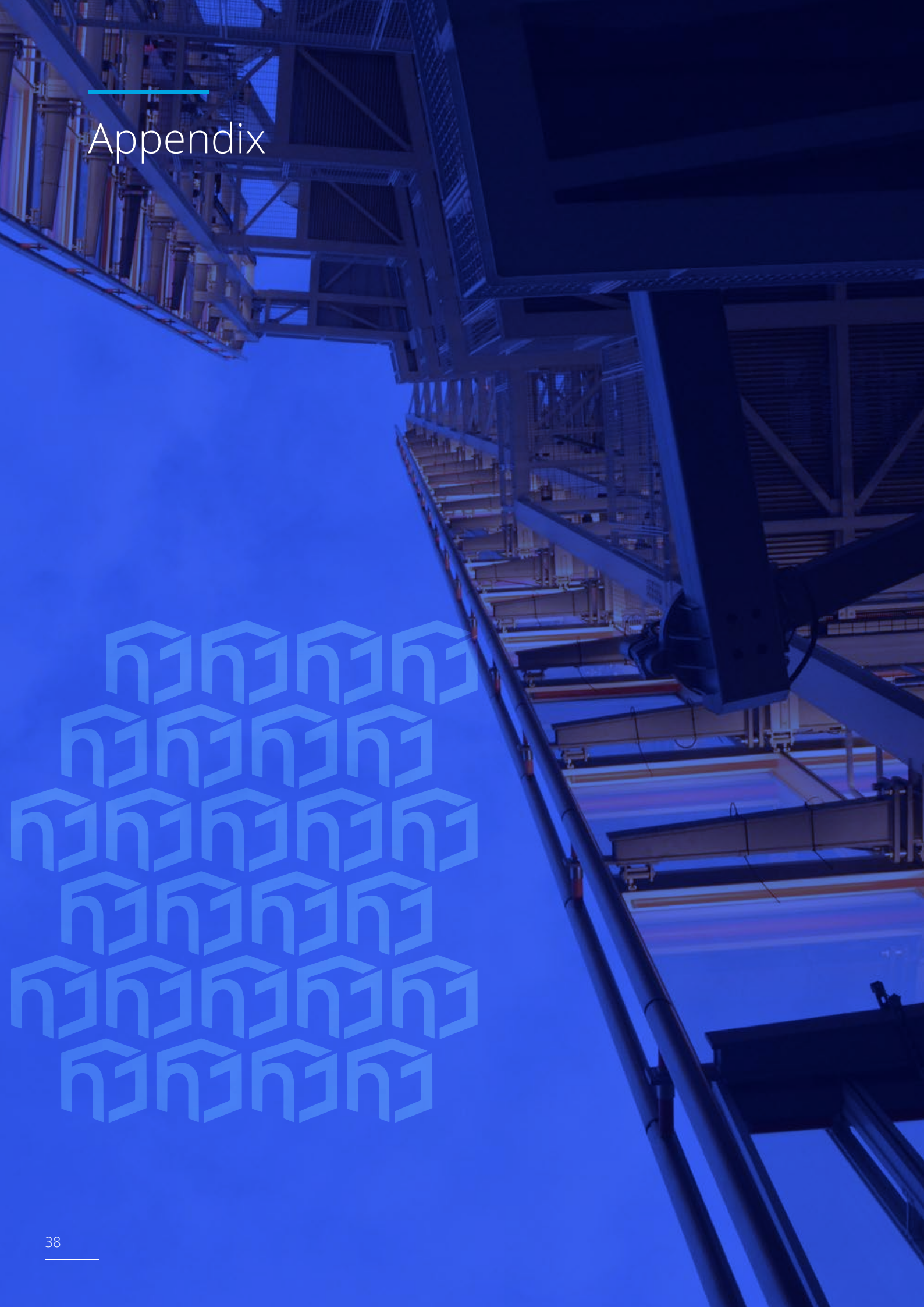
When working with Nasahi® Panels, it is recommended that the following Australian compliant PPE is worn as a minimum:

- P1 or P2 Dust masks
- Protective glasses / goggles
- Ear Plugs / Ear Muffs – Class 5
- Gloves, long sleeve shirt and long pants
- Protective footwear

HAZARDOUS MATERIALS

For MSDS of all components sold by Nasahi®, please visit our website www.nasahi.net.au.

Appendix



MATERIAL PROPERTIES

Appendix Table 1 - Material Properties

PROPERTY	STANDARD	VALUE	UNITS
Panel Thickness *d*		50, 62 & 75	mm
Panel Width *w*		600	mm
Panel Length *L*		2200mm	
Panel edge profile		Square Edge	
AAC Dry Density, ρ	AS 5146.2 Appendix C	525	kg/m^3
AAC Density for design, ρd	AS 5146.2	590	kg/m^3
AAC Density for transport and lifting, $\rho tran$	AS 5146.2	775	kg/m^3
AAC Characteristic Compressive Strength, $f ck$	AS 5146.2 Appendix D	3.1	MPa
AAC Characteristic Flexural Strength, $f ut$	AS 5146.2 Appendix E	0.50	MPa
Reinforcing yield stress	AS 4671	>500	MPa
Reinforcing tensile strength	AS 4671	>600	MPa
Reinforcing weld strength	AS 4671	>0.5 of force at yield of a longitudinal bar	
Design Serviceability Limit State Deflection Limit, max	AS 5146.1	SPAN/250	
Youngs Modulus (E)	AS5146.2:2018	1800	MPa

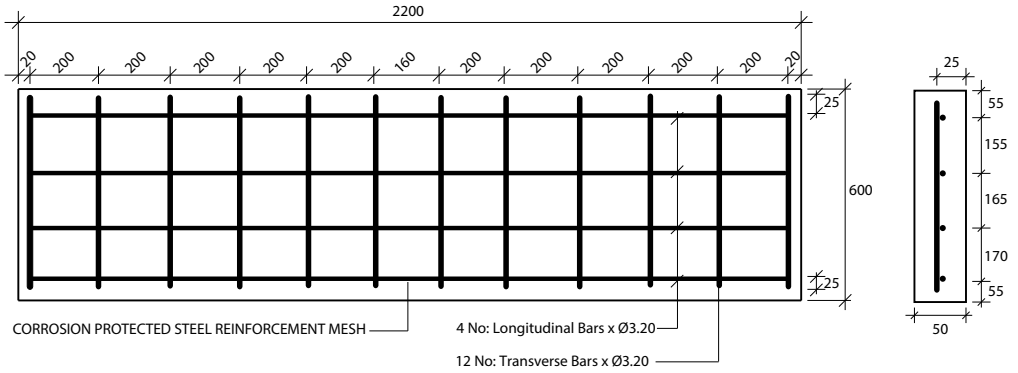
Note:

1. Dry density is achieved by oven drying specimens so that the moisture content is close to 0%.

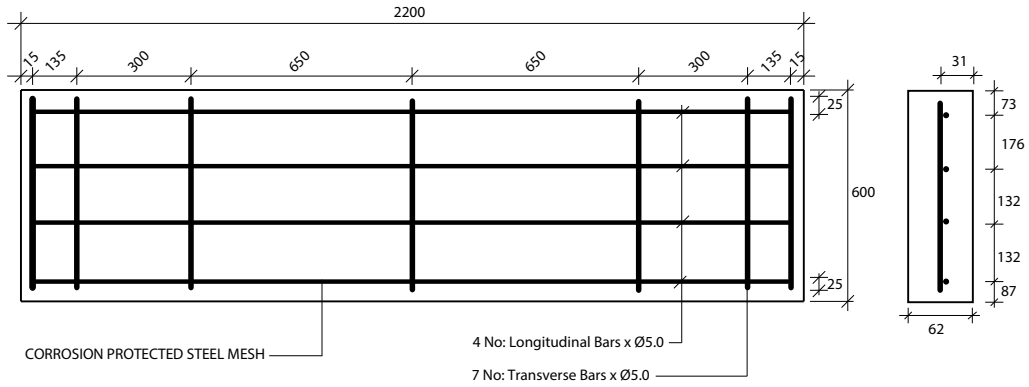
2. A design density of 590kg/m^3 has been calculated using a 12.4% moisture content.

PANEL REINFORCING LAYOUT

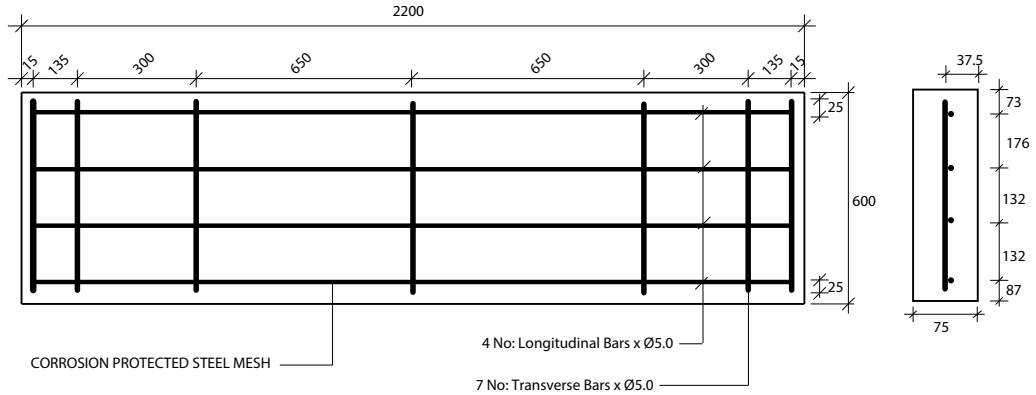
50MM THICK PANEL (50 X 600 X 2200)



62MM THICK PANEL (62 X 600 X 2200)

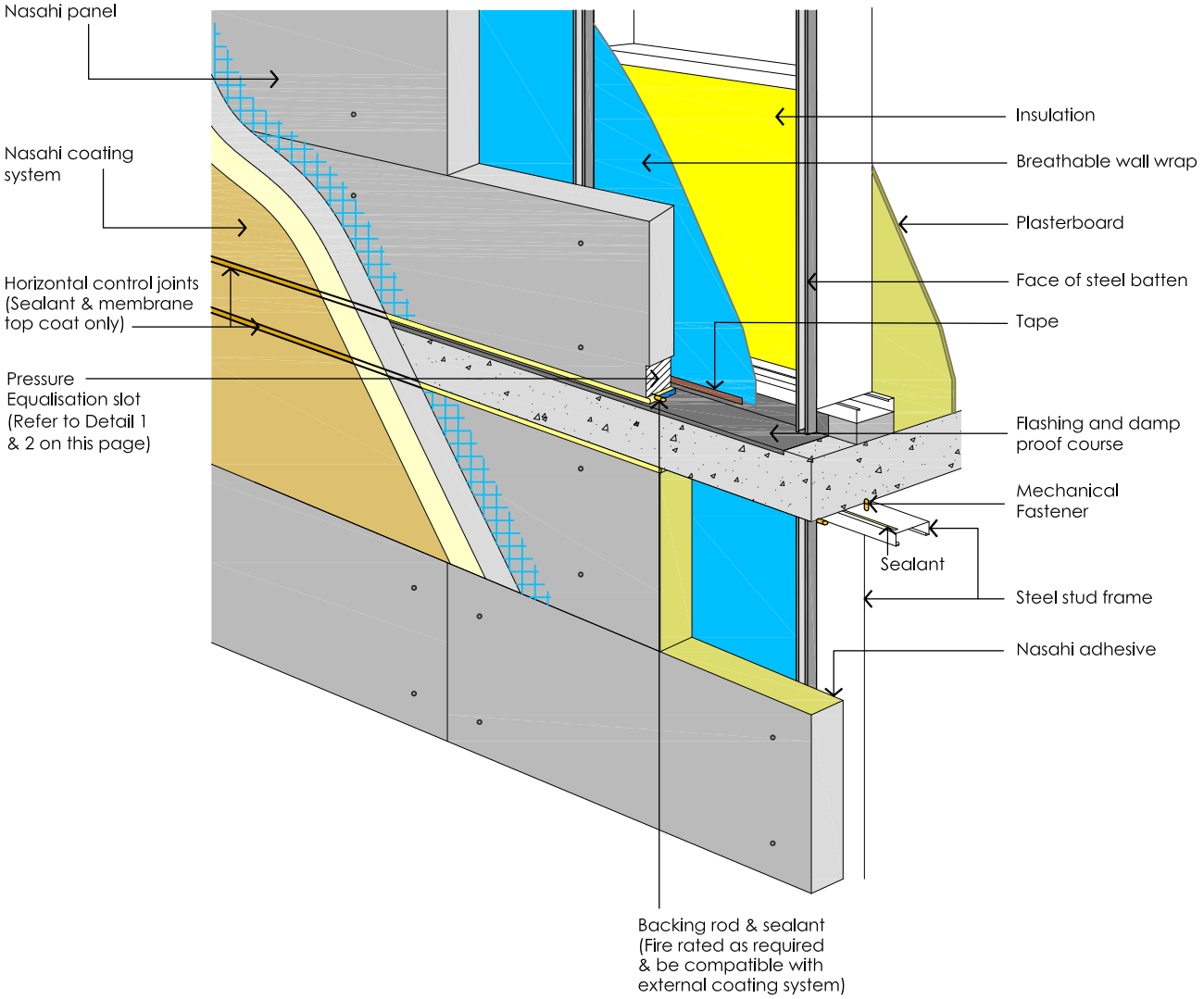


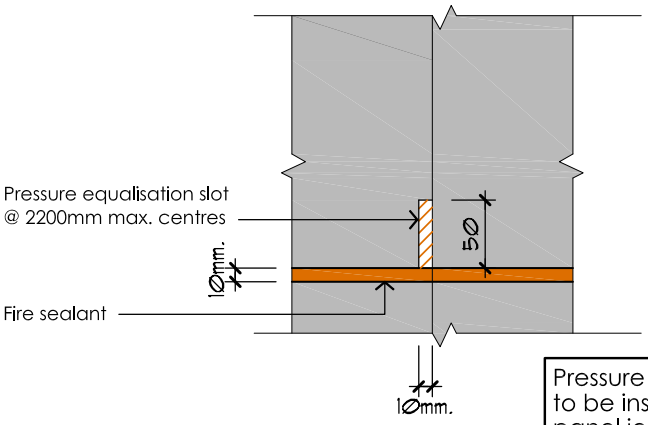
75MM THICK PANEL (75 X 600 X 2200)



CONSTRUCTION DETAILS

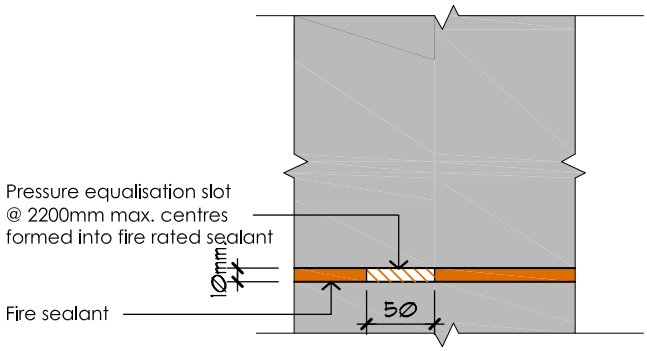
OPTION A - Exposed Edge Beam





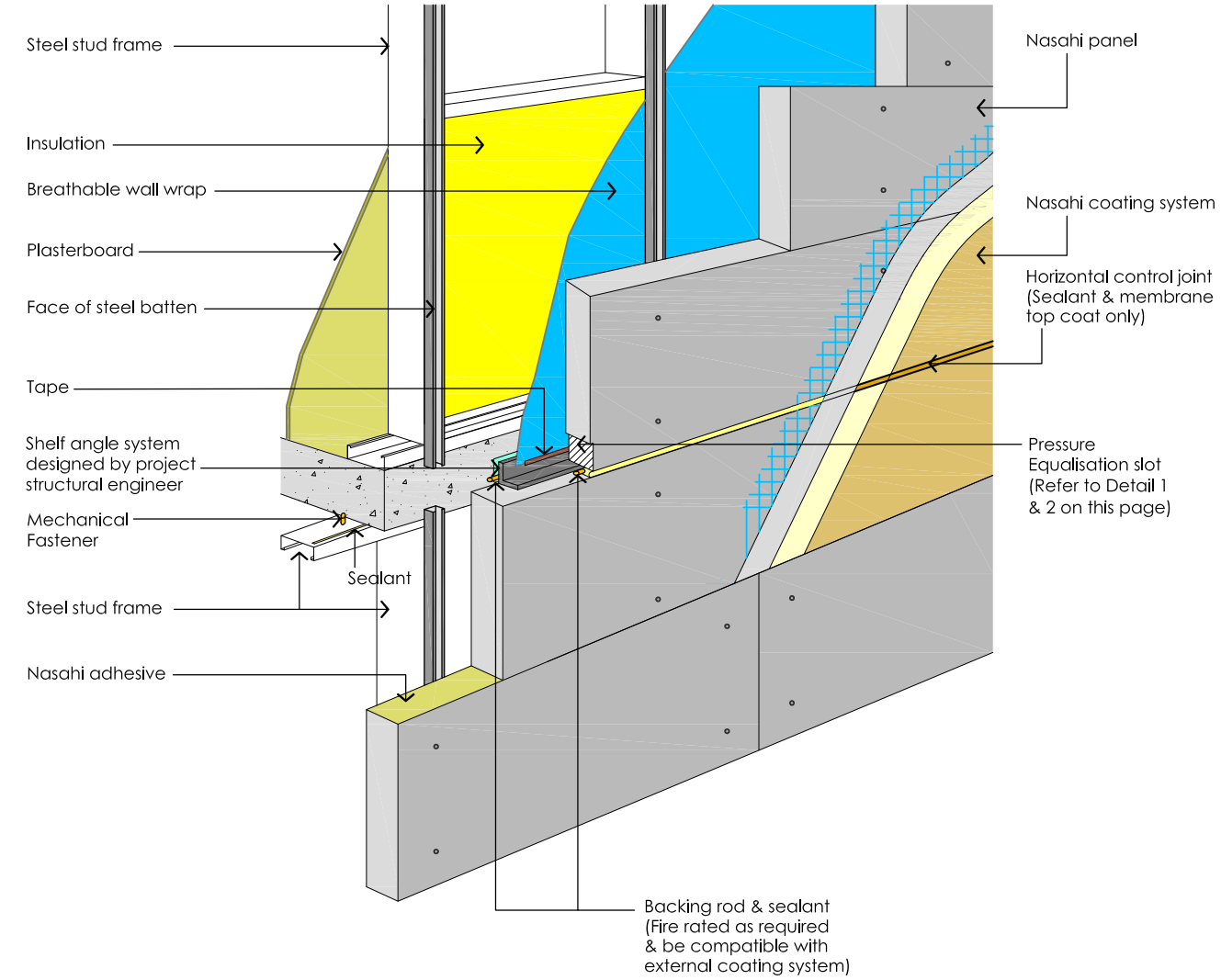
DETAIL 1.1

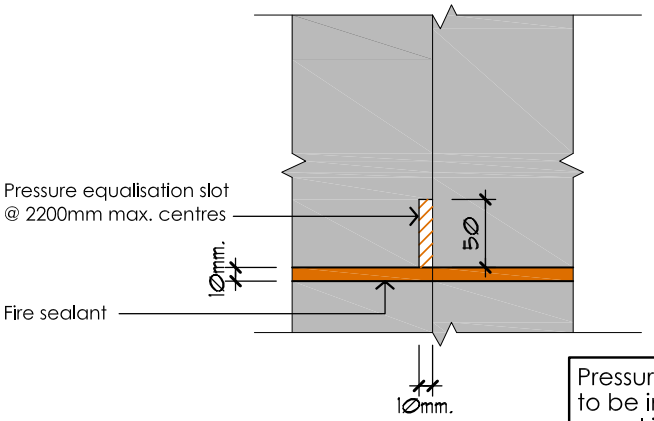
Pressure equalisation slots to be installed at vertical panel joints or into fire sealant @ 2200mm max. ctr.



DETAIL 1.2

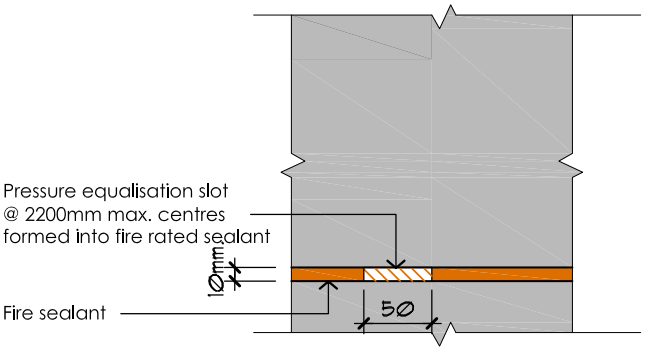
OPTION B - Concealed Edge Beam





DETAIL 2.1

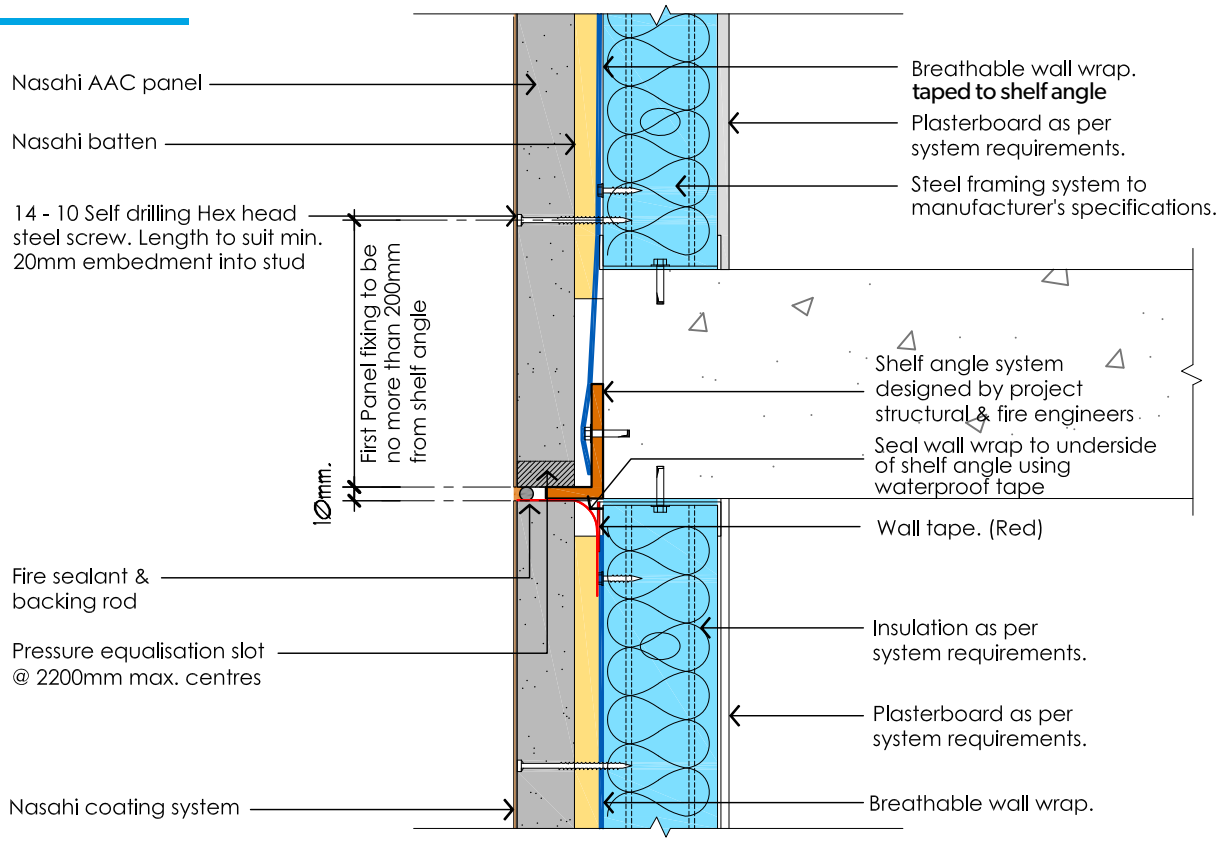
Pressure equalisation slots to be installed at vertical panel joints or into fire sealant @ 2200mm max. ctr.



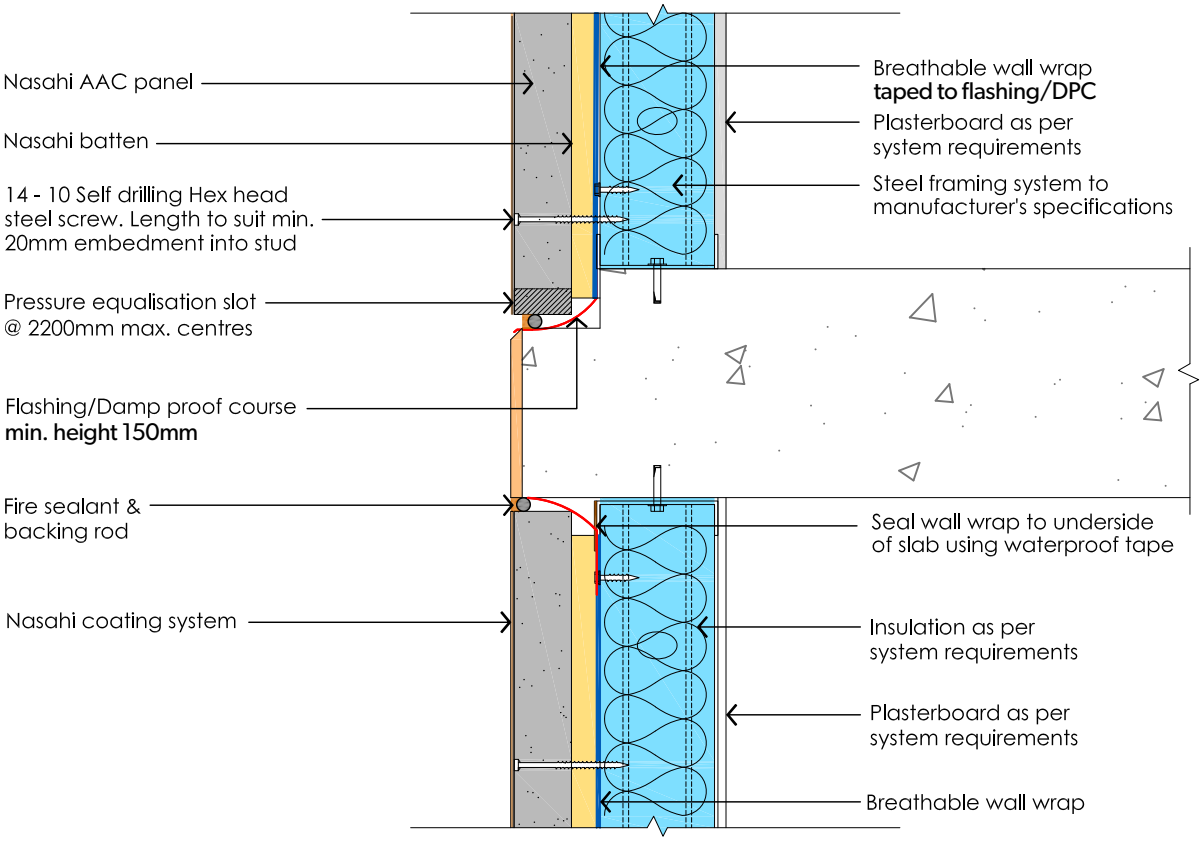
DETAIL 2.2

The Nasahi External Wall System consist of **either a** 50, 62 & 75mm thick Nasahi panel, reinforced with corrosion protected steel in both longitudinal and transverse directions, installed horizontally in a stretcher-bond pattern over continuous vertical battens attached to the load bearing steel frame. Nasahi adhesive is applied to all edges of the panel (except control joints) along with minor patches, repairs and stopping of screws. Only Nasahi approved coating systems are to be applied over Nasahi panels.

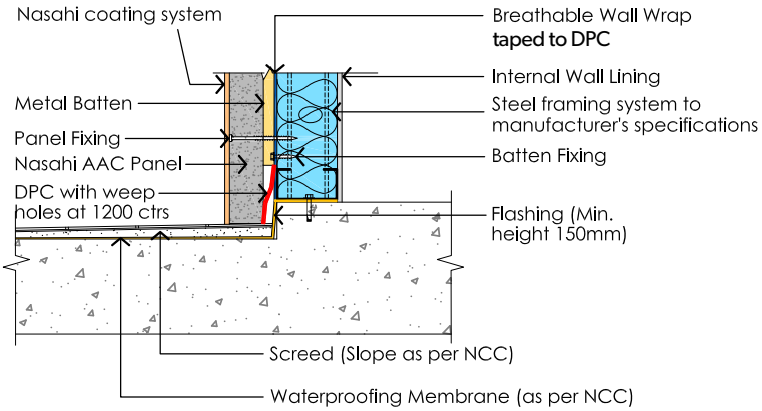
SECTION



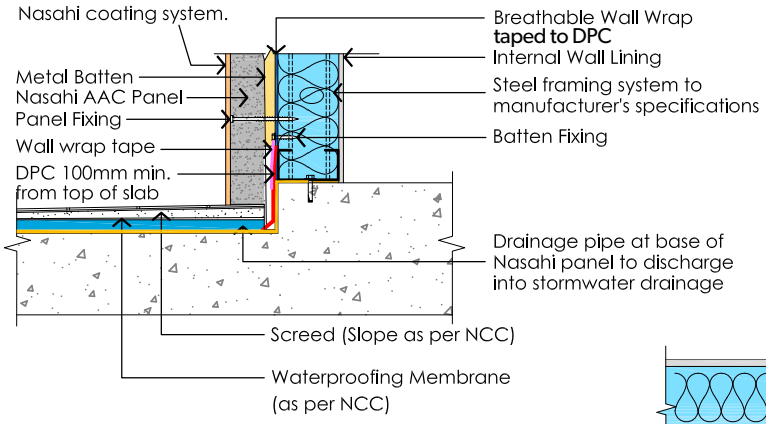
DETAIL 3.1 - Concealed Edge Beam



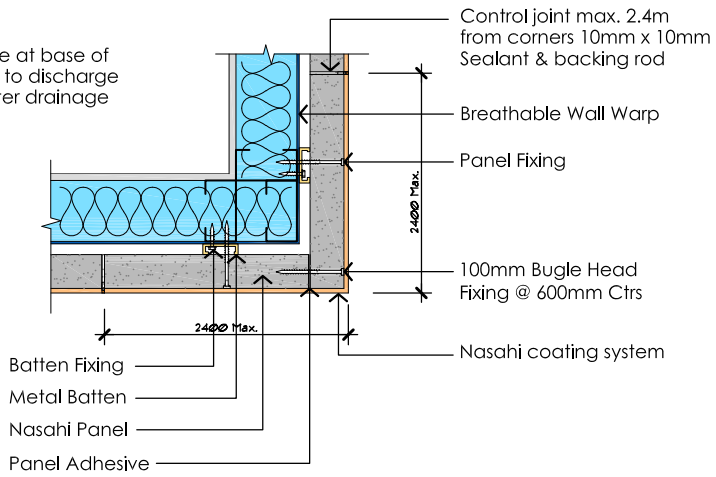
DETAIL 3.2 - Exposed Edge Beam



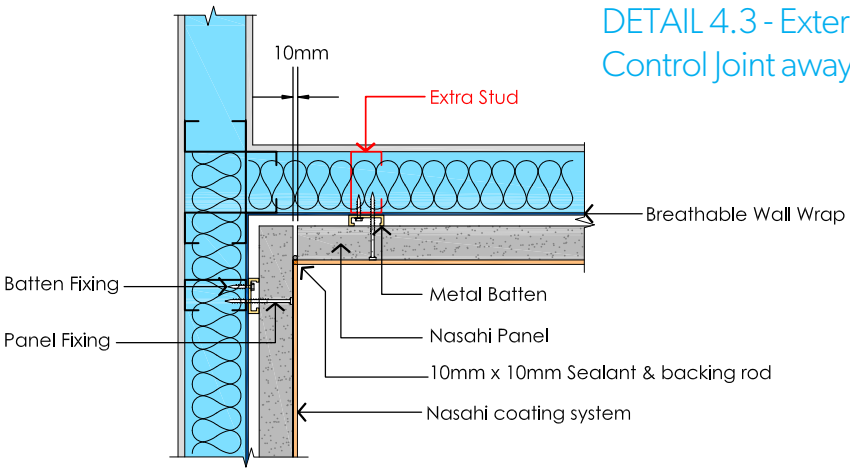
DETAIL 4.1 - Balcony Detail



DETAIL 4.2 - Balcony Detail

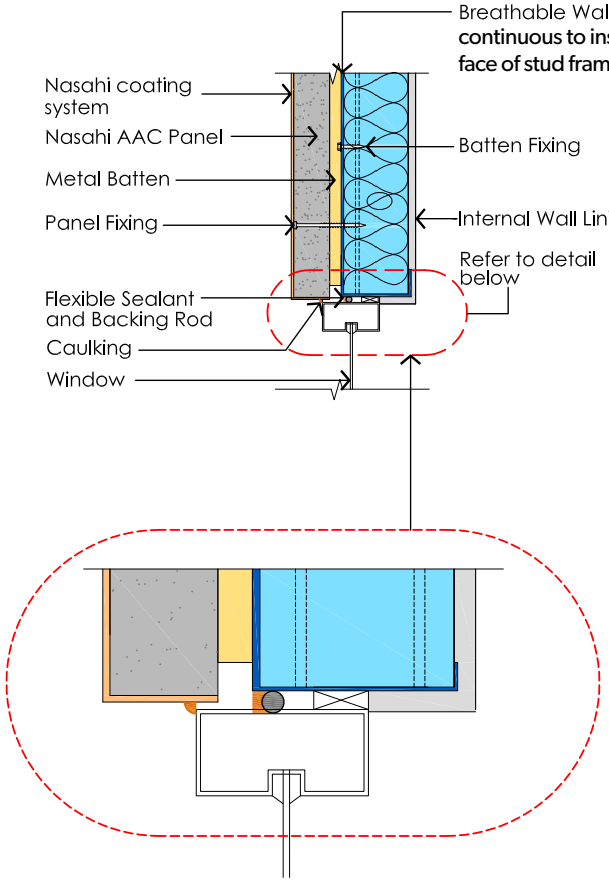


DETAIL 4.3 - External Corner Detail with Control Joint away from Corner on Both Sides

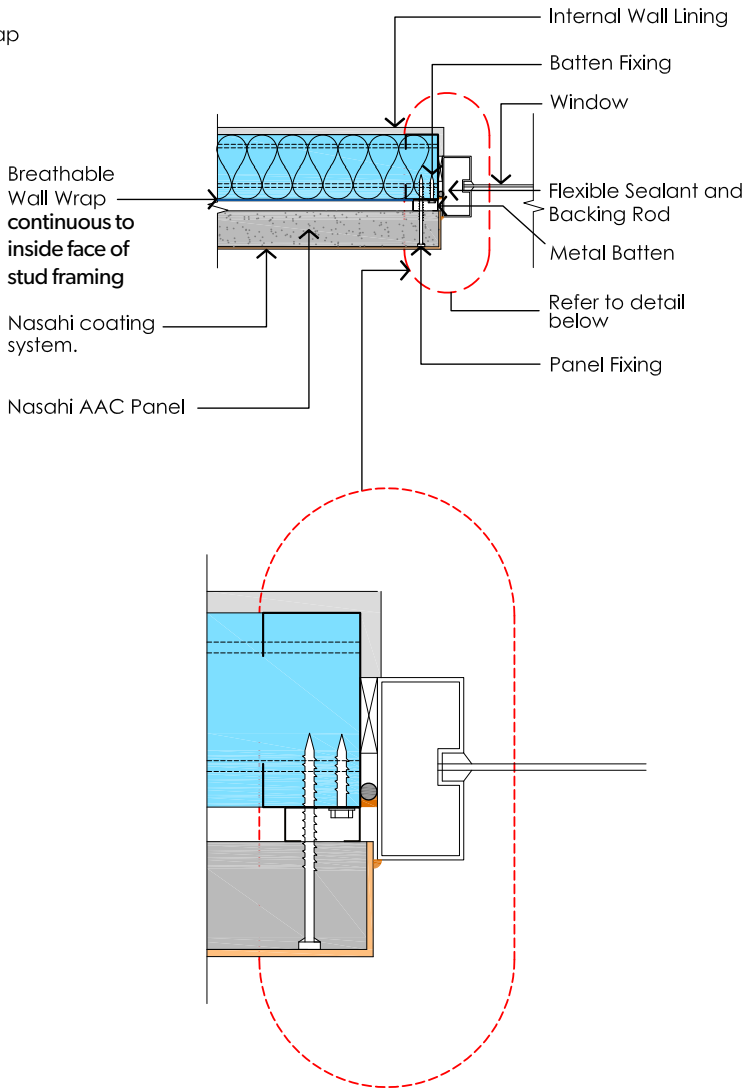


*NOTE: Internal corners require an extra stud for panel attachment 150mm back from the internal corner.

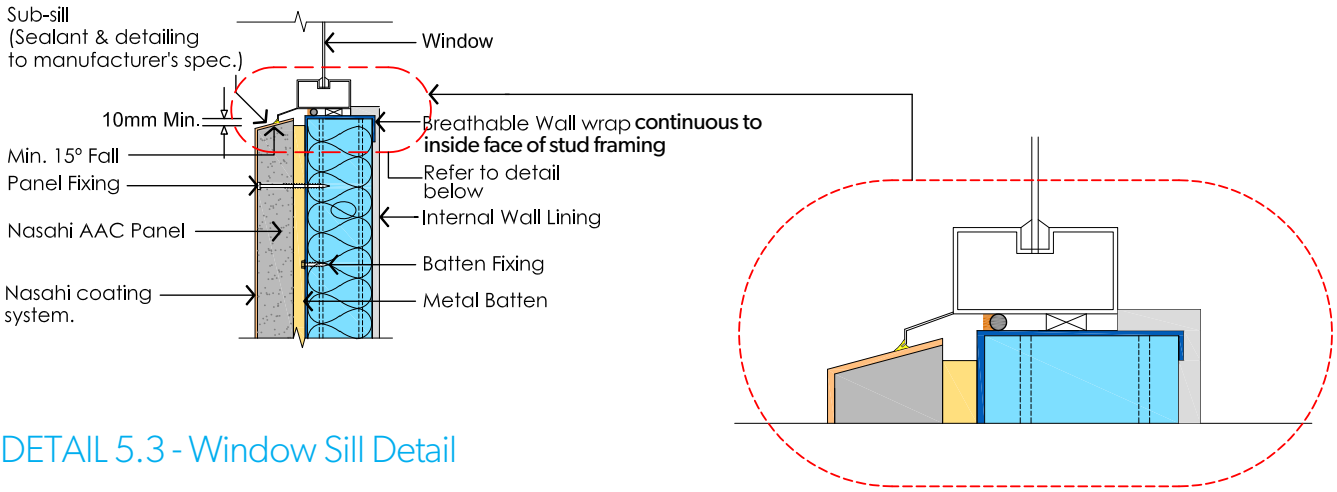
DETAIL 4.4 - Internal Corner Detail



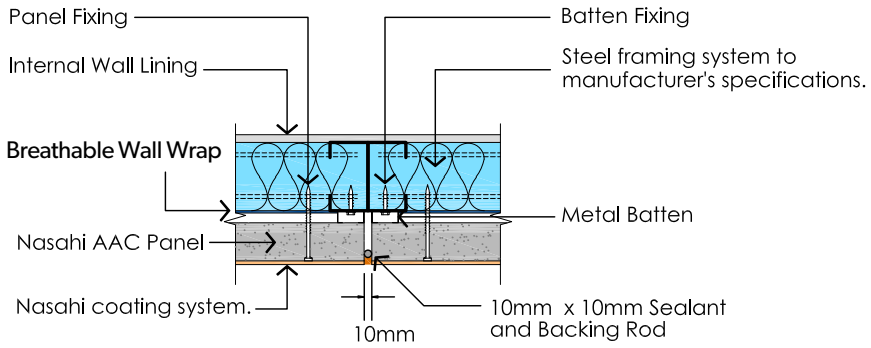
DETAIL 5.1 - Window Head Detail



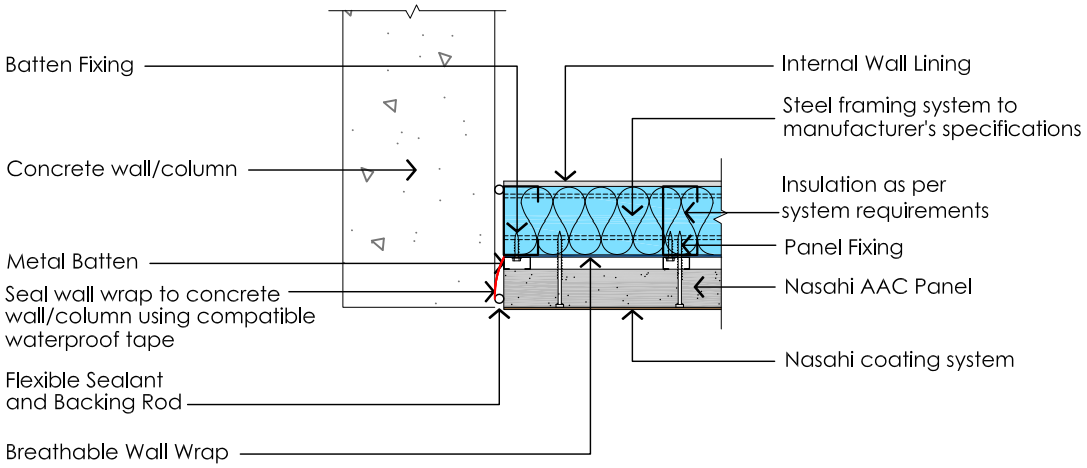
DETAIL 5.2 - Window Jamb Detail



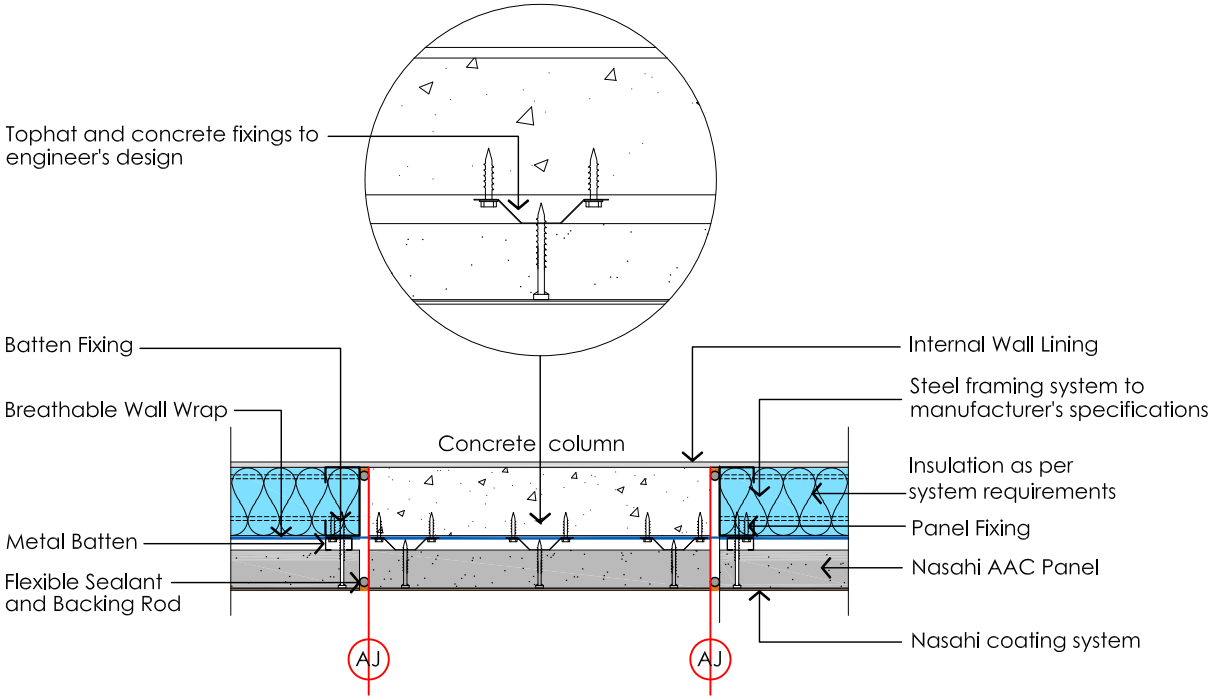
DETAIL 5.3 - Window Sill Detail



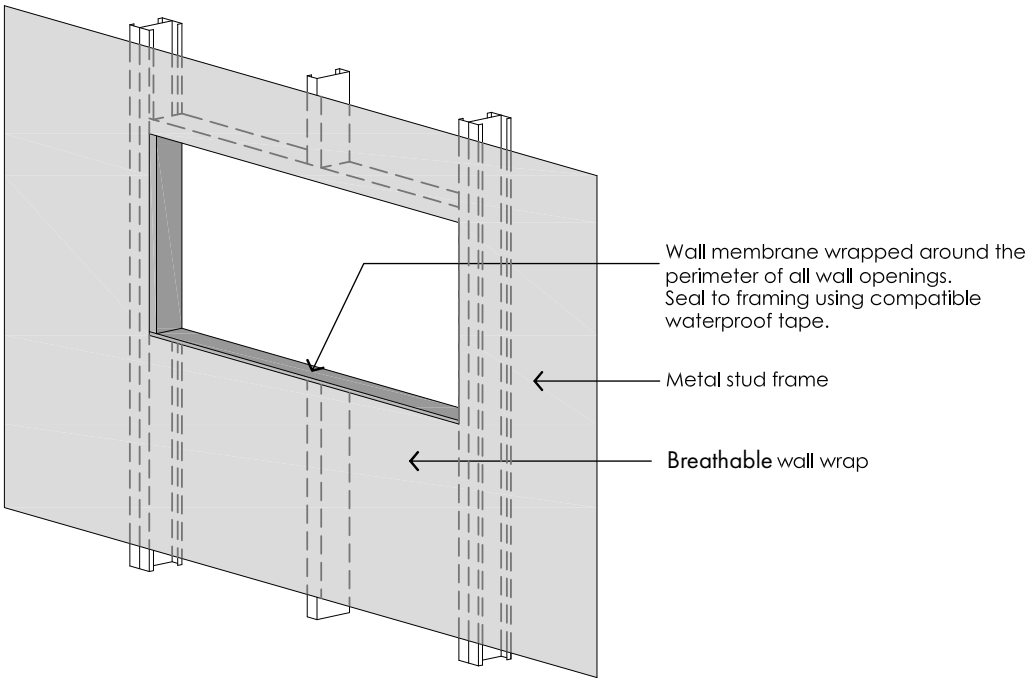
DETAIL 6.1 - Vertical Control Joint Detail



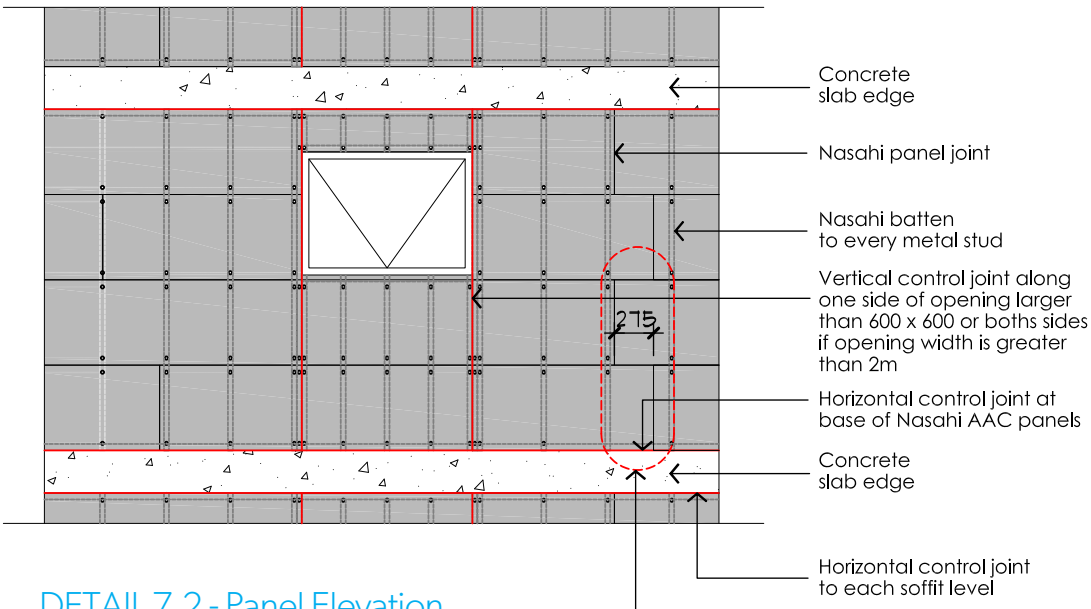
DETAIL 6.2 - External Wall / Column Detail



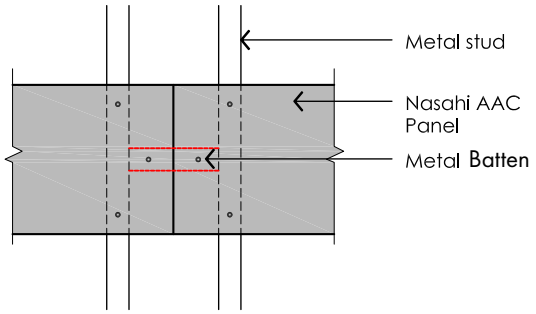
DETAIL 6.3 - External Wall / Column Detail



DETAIL 7.1 - Wall Membrane at Openings

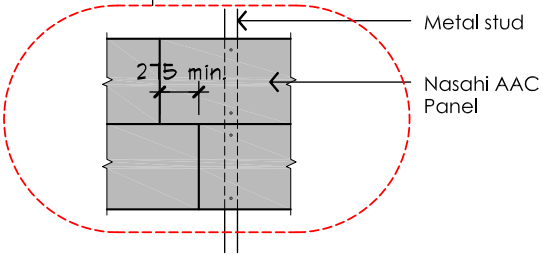


DETAIL 7.2 - Panel Elevation

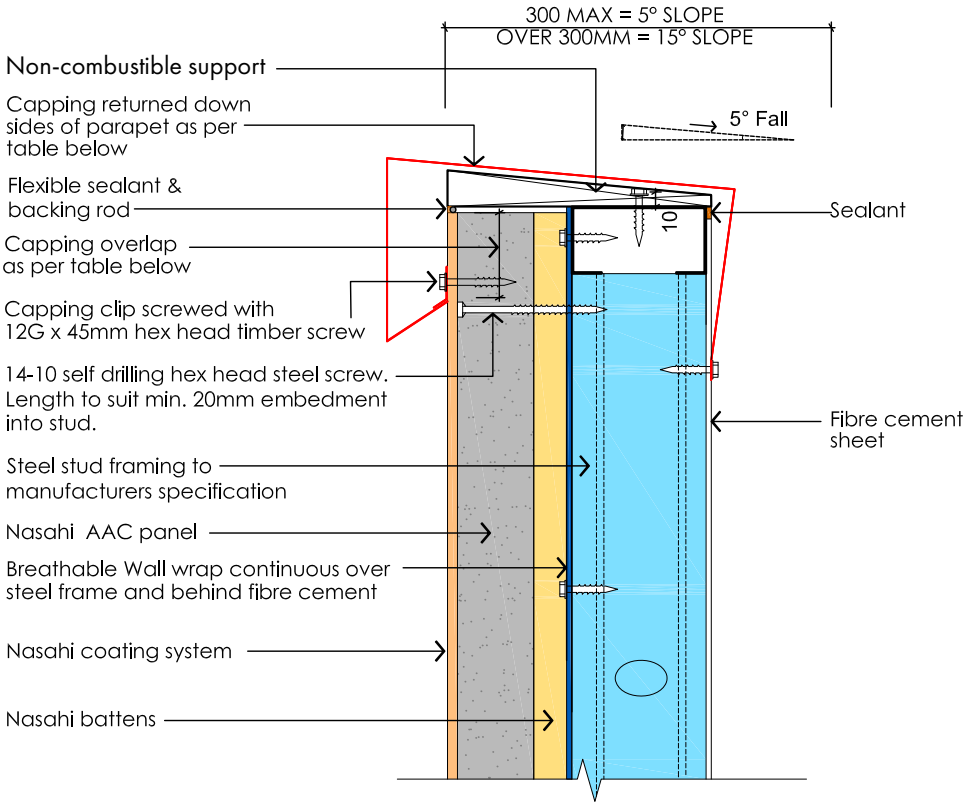


DETAIL 7.3 - Back Blocking for Missaligned Panel

(Only for aesthetic purposes, so panels are aligned & flush)



Panel Stagger Joint

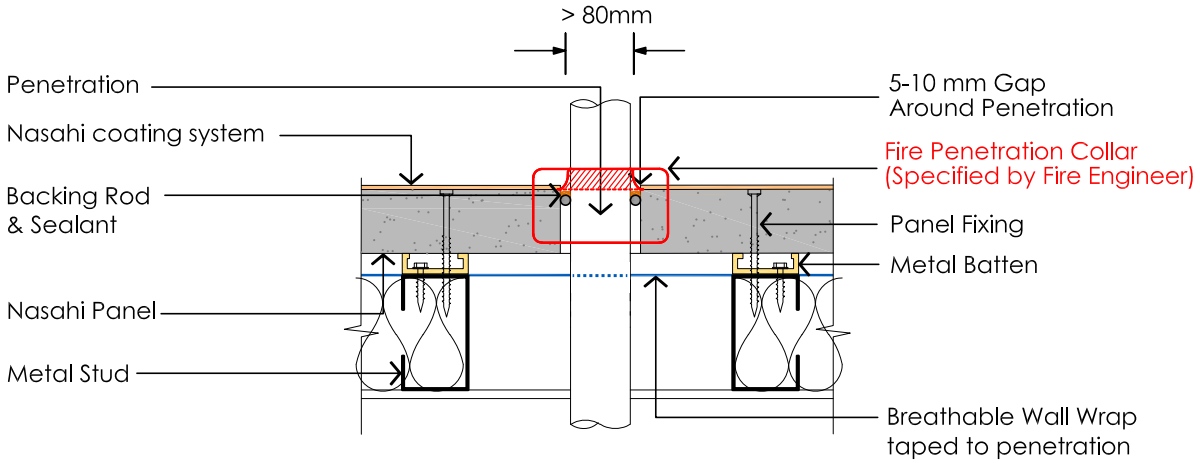


DETAIL 8 - Parapet Detail

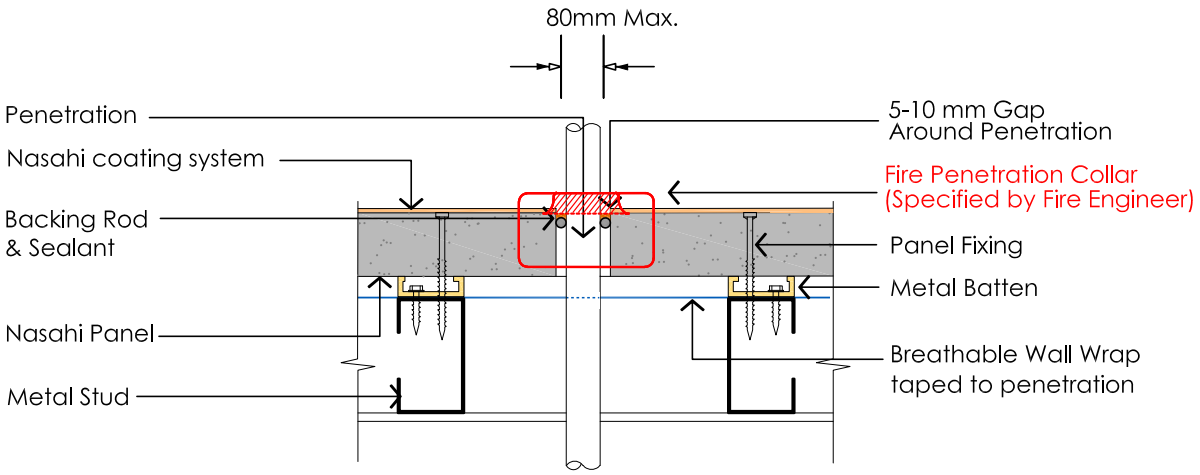
Ultimate Design Wind Pressure (kPa)	Capping Overlap Minimum (mm)
1.5	50
3.5	100
5.0	150

Note:

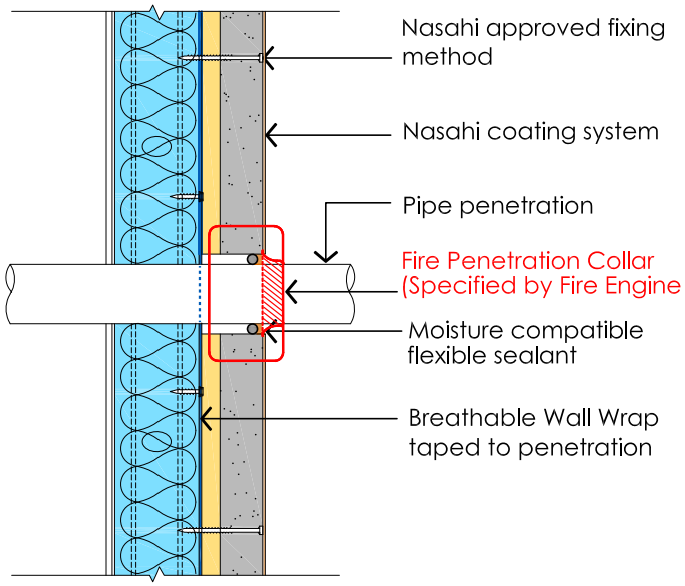
Parapet capping shall be designed in accordance with installation code for metal roofing. Stop ends shall be incorporated to all flashings.



DETAIL 9.1 - Typical Penetration (Greater than 80mm)



DETAIL 9.2 - Typical Penetration (Smaller than 80mm)



WHERE ELECTRICAL CABLES PENETRATE BATTEN, A SLEVE OR CONDUIT SHALL BE PROVIDED AND SEALED INTO NASAHI 50MM PANELS. ALL WIRES THAT PASS THROUGH A CONDUIT SHALL BE SEALED INTO POSITION INSIDE CONDUIT

ANY PENETRATION MUST HAVE BREATHABLE WALL WRAP TAPED AND PANEL FACE SEALED WITH FLEXIBLE SEALANT AND BACKING ROD.

DETAIL 9.3 - Pipe Penetration

Guarantee

NASAHI® GUARANTEE THE PRODUCTS MANUFACTURED BY US AND THE SYSTEMS DESCRIBED IN NASAHI® LITERATURE FOR 7 YEARS, SUBJECT TO THE TERMS AND CONDITIONS OF THE NASAHI GUARANTEE WHICH CAN BE FOUND ON OUR WEBSITE. NASAHI® DOES NOT GUARANTEE COMPONENTS, PRODUCTS OR SERVICES, SUCH AS INSTALLATION, SUPPLIED BY OTHERS. NASAHI® RECOMMENDS THAT ONLY PRODUCTS, COMPONENTS AND SYSTEMS RECOMMENDED BY IT BE USED.

Nasahi® Approved Coating Systems used with the Nasahi® External Wall System must be guaranteed by the coating manufacturer and meet the minimum performance requirements specified by Nasahi®. It must have been prepared and installed in accordance with the manufacturers written instructions and technical specifications.

Only projects for which a completed Nasahi® Installation Compliance Certificate has been received will be eligible for the Nasahi® guarantee. Blank certificates are available from our website.

This guarantee applies to the performance of the system for the uses outlined in this Installation guide and excludes liability for consequential damage or losses in connection with defective cladding, other than those imposed by legislation.

WARRANTY

The Nasahi® Panel, when installed in accordance with this guide, are warranted for a minimum of 15 years (from date of purchase) to be free from any defects subject to the conditions and exclusions set out in the Nasahi® Warranty Document available at our website.

Nasahi® Panels are warranted to not materially degrade, corrode or break down during the Term of this warranty (Nasahi® Warranty Document).

This exceeds the 7-year requirement outlined in the NCC and the relevant Australian Standards.

DISCLAIMER

The information presented within this Installation guide is provided in good faith and to the best of our knowledge is accurate at the time of preparation. The provision of this information should not be interpreted as a recommendation to use any of our products in violation of patent rights or in breach of statutes or regulations. users are advised to make their own determination as to the suitability of this information in relation to their particular project and circumstances. As the information contained within this Installation guide may be applied under conditions beyond our control, no responsibility can be accepted by Nasahi®, or its staff for any losses or damage caused by any person acting or refraining from action as a result of misuse of this information.

AAC Building Products Pty Ltd T/A NASAHI® reserves the right to alter or update inclusive information from time to time without notice.

Notes

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