Low-rise External Wall System

HORIZONTAL DESIGN AND INSTALLATION GUIDE

50MM
62MM
75MM

EDITION: MARCH 2021

NASAHI®
building smarter

CertMark International

CODEMARK Australia

Certificate CM40326

NASAHI®

building smarter

Contents

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 AUD$60 million in the most technologically advanced processes in the industry. Our production facility has the capacity of 700,000 m3 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.

Autoclaved Aerated Concrete (AAC)

AUTOCLAVED AERATED CONCRETE IS A LIGHTWEIGHT PRE-CAST 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 a length of 2200mm 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.

Excellent airborne noise transmission properties result in a quieter, more comfortable home for your family.

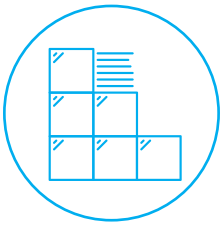
Manufactured from lightweight, reinforced, autoclaved aerated concrete, Nasahi® Panels have a Design (Working) Density of 590 kg/m^3 and a Dry Density of 525 kg/m^3 making them highly resistant to chipping and damage during delivery and handling.

Table 1 - Panel Weights (2200x600mm panel)

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

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

Advantages of Nasahi®



QUICK INSTALLATION

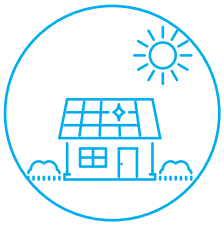
3 qualified tradespeople can easily install 50m^2 of Nasahi® Panel per day, making it significantly faster and less labour intensive than traditional masonry

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 in all Australian bushfire regions. Nasahi® Panels have been rigorously tested and will provide an FRL of up to 120/120/120 using standard 10mm plasterboard internal lining.

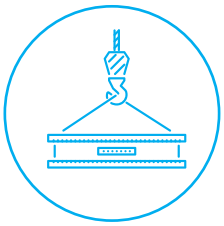


THERMAL COMFORT

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.

Design Process

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

STEP 1: SITE WIND LOADS

Determine the site wind load requirements including wind category, terrain category, topography and other factors that are required to calculate the site wind pressures acting on the cladding Page 17.

STEP 2: OTHER REQUIREMENTS

In addition to wind loads, these will include weatherproofing & energy efficiency, and may also include fire resistance levels (FRL), bush-fire attack level (BAL) & sound insulation.

Weatherproofing limitations to buildings that;

1. Have a risk score of 20 or less when calculated using table FV1.1 or V2.2.1(a) of the 2019 NCC;
2. Are not subject to design wind pressures greater than;

   a. For ultimate limit state, External Walls, N5, C3 or +/-5.3kPa, Boundary Walls N2 or +/-1.4kPa.

   b. For serviceability limit state External Walls +/-1.65kPa Boundary Walls +0.55, -0.83kPa.
3. Includes only windows that comply with AS2047.

STEP 3: SELECT CAVITY

Using Table 6 on Page 17, or details on Page 32 and 33. Select the appropriate cavity and fixing layouts to meet the requirements outlined in step 1.

STEP 4: ENERGY EFFICIENCY

Using Table 9, 10 and 10A on Page 23, 24, 25, select the appropriate insulation and breathable wall wrap material to meet the energy efficiency and weatherproofing requirements determined in Step 2.

STEP 5: CALCULATE REQUIRED COMPONENTS

Determine the number of panels, battens and fasteners required for the project.

Design Principles

THIS TECHNICAL GUIDE SPECIFIES DESIGN PRINCIPLES FOR THE NASAHI® EXTERNAL WALL PANEL SYSTEM THAT COMPLY WITH THE PERFORMANCE REQUIREMENTS OF THE NCC AT THE TIME OF WRITING. THE DESIGNER MUST CHECK THE ADEQUACY OF THE BUILDING SOLUTION FOR COMPLIANCE WITH THE APPROPRIATE AUTHORITY.

A) LATERAL WIND LOADS

Lateral wind loads experienced by the panels are transferred through the panel fasteners, and into the load bearing stud frame, which must be designed in accordance with the relevant Australian Standards for the site loads determined earlier. Battens are designed to act as non-structural cavity spacers. The frame must be designed for all bracing and hold-down requirements.

B) OPENINGS

Windows, door frames and penetrations must be sealed and a water resistant approved external coating must be applied to the external surface of the panel.

C) BOUNDARY

For boundary wall applications, panels may be installed uncoated provided the wall is made weatherproof at the top and sides, and a drained cavity is present between adjoining boundary walls. Insulation batts must be 'strung' between studs to prevent contact with the inside face of the panel.

CRITERIA FOR CORNER PANELS

Panels within a distance of 1200mm from building corners experience higher wind loads. Due to this increase of wind load, extra battens and screws may be necessary in each direction from the corner. Batten and fixing spacing requirements are shown in details on Page 39.

FRAMING DESIGN

The load bearing stud frame must be designed in accordance with NCC requirements for timber or steel frames, taking into account the permanent loads imposed by the panels as outlined in Table 4 on Page 13.

TIMBER FRAMES

Timber framing must be designed in accordance with the relevant parts of AS1684. Stud spacing and height should be designed to suit the wind loadings and panel permanent loads in accordance with local codes. Noggins must be flush fitted at a maximum of 1350mm centre spacing.

Timber framing shall comply with clause C1.13 of the 2019 NCC if used in Type A or B construction.

STEEL FRAMES

Steel framing must comply with NASH Standard 2005. For steel framing the minimum framing specification is 'C' section studs and noggins of overall section size 75mm web and 32mm flange. Minimum Steel thickness must be in accordance with AS3623 and AS/NZ4600.

BRACING

Timber and steel framed walls must be braced for a medium weight wall cladding in accordance with AS1684 for timber framing and AS3623 and AS/NZS4600 for steel framing.

Design Detail Considerations

WALL PANEL LAYOUT

Construction should be designed in 275mm horizontal modules Refer to Page 52.

This will help minimise the number of panels required during construction, and reduce the likelihood of cutting through the embedded corrosion protected steel mesh. Steel reinforcing mesh layout can be seen in Details on Page 48.

PENETRATIONS

Services should be run through the frame, not installed in the wall cavity. Where services penetrate through the wall, a 5-10mm gap should be created around the service. Gaps must be filled with backing rod and an appropriate flexible sealant (fire rated where specified). A fire rated penetration collar may be required around the service and penetration, check with the project engineer.

FOOTINGS

All applications of the wall systems shall only be applied to buildings with footings and slabs in accordance with AS2870 (for class 1&10 Buildings).

Panels can either be supported on an AS2870 compliant rebated slab edge, or hung from the load-bearing frame overhanging the concrete slab or timber base. Maximum overhang 250mm as shown in Detail 1.1 on Page 50. For bushfire rated applications, rebated slab installations are recommended and appropriate measures must be taken for control of burning embers as required by the NCC.

TERMITES

Nasahi® Panels are resistant to termites, however, termite protection is a mandatory requirement to protect internal building components. Termite protection must be installed in accordance with local codes and NCC requirements taking into account state variations.

Control Joints

Render cracking is caused by stresses due to various building materials expanding and contracting at different rates. Control Joints shall be a minimum of 10mm wide and shall consist of an expanded polystyrene tube or backing rod and a polyurethane multi-purpose external grade material gunned into the joints to form a 10mm wide x 5mm deep flexible seal.

Control joints shall incorporate de-bonding tape. For walls requiring resistance against fire, a fire rated sealant suitable for the degree of fire resistance shall be used. See Details 10.1 and 10.2 on Page 57.

Reference AS5146.3 Clause 2.9

Table 2 - Vertical Control Joint Locations

VERTICAL

- At all internal corners
- At centres not exceeding 6m (or as per site class)
- 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 supported concrete slabs
- On both sides of openings greater than 2.5m wide and on one side of the openings greater than1.8m
- As per engineers design specification
- At corners, as measured from the inside edge, as follows:
  - At corners of itself
  - At maximum 1.2m one side of a corner
  - At a maximum of 2.4m on each side of a corner

SPACING OF ARTICULATED JOINTS IN HOUSES AND LOW-RISE MULTI-RESIDENTIAL BUILDINGS

Site Class	Joint Spacing, m
A,S	*6.0*
M,M-D	*5.5*
H1, H1-D	*5.0*
H2, H2-D	*4.5*

Note: Site class as defined in AS 2870. For further information and guidance on site classification, refer to AS 2870.

Reference AS5146.3 Table 2.9.1

Table 2A - Horizontal Control Joint Locations

HORIZONTAL

- When timber joists are not seasoned* a minimum gap of 20mm is required if the panel joints are within the FLOOR JOIST ZONE (See Detail 6.1 on Page 46.)

A 10mm Horizontal control joint (see Detail 6.1 on Page 46) is required at each FLOOR JOIST ZONE except where: Steel joists, or joists with steel webs are used and horizontal panel joints are not within the FLOOR JOIST ZONE. In this case, the maximum horizontal control joint spacing shall be 6m.

*Less than 1% shrinkage of the floor joist depth as confirmed by the design engineer

Reference AS5145.3 Clause 2.9.2

External Coatings

EXTERNAL COATINGS

The selected external coating must provide weatherproofing and durability. Nasahi® approves coating systems that achieve the performance levels outlined in Table 3 below and Table 4 on Page 15 and Clause 2.8.4 of AS 5146.3. Nasahi® have provided an example of a coating system below 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 3 - 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 panels 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 4 - Recommended Coating System

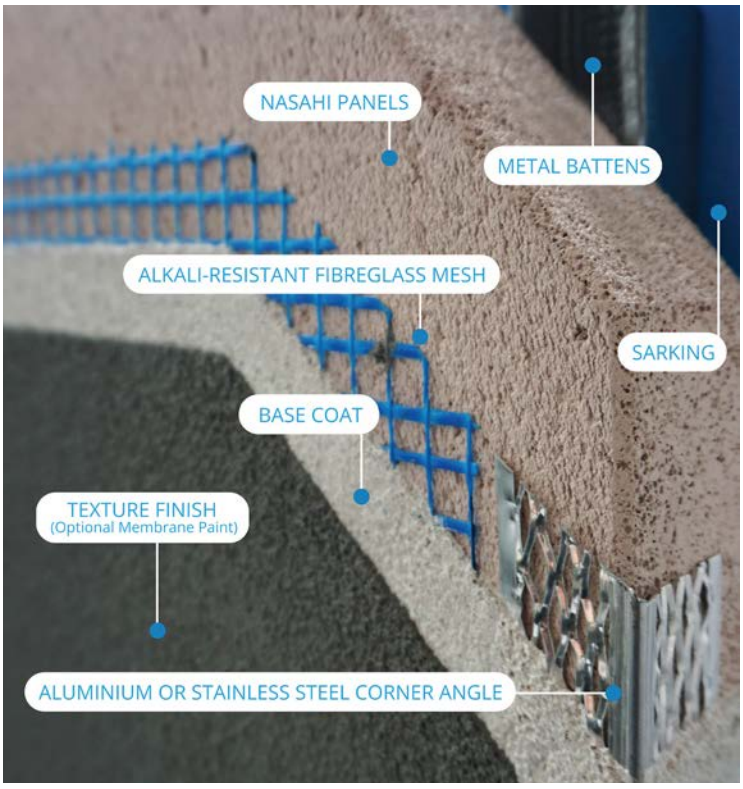
APPLICATION TO	RECOMMENDATION
External Corner Angles	32mm x 32mm Aluminium, PVC or Stainless-Steel corner angles.
Primer Coat (to manufacturer specifications)	Primer/Sealer to enhance adhesion (if required by coating manufacturer)
Base Coat Render*	High build acrylic, Portland cement-based render with 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 C1.14(I) of the NCC 2019, 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 CP1 and CP2 of the NCC.

Only Aluminium or Stainless Steel corner angles (and not PVC corner angles) may be used in Type A or B construction.



Structural Performance

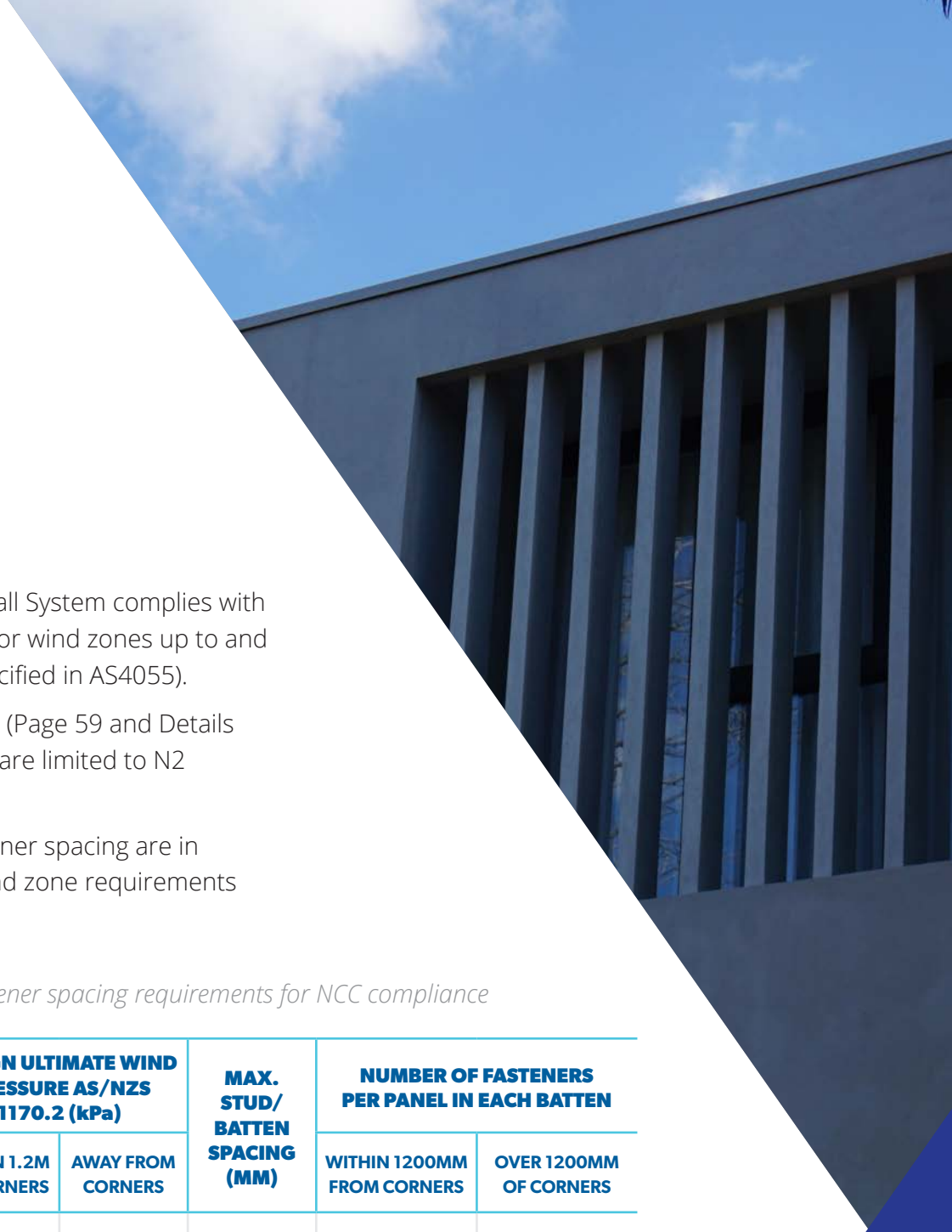
THE NASAHI® EXTERNAL WALL SYSTEM IS A NON LOAD-BEARING SYSTEM THAT IS DESIGNED TO BE INSTALLED ONTO A LOAD BEARING TIMBER OR STEEL FRAME.

PANEL WEIGHT

For panel on slab installations, the panel weight is supported by the slab and no additional frame design is required. In the event that the panels are suspended from the frame, the frame designer must allow for the weight of the panel and external coatings as shown below:

Table 5 - Panel Loads

PANEL THICKNESS	50mm	62mm	75mm
Design Dead Load (kN/m^2)	0.36	0.45	0.53
Panel Weight (kg/m^2)(590kg/m^3)	29.6kg	36.4kg	44kg
Panel Weight (600x2200mm) (590kg/m^3)	39kg	48kg	58kg



WIND ZONE

The Nasahi® External Wall System complies with the NCC requirements for wind zones up to and including N5, C3 (as specified in AS4055).

Nasahi® Boundary Walls (Page 59 and Details 12.1, 12.2, 13 and 13.1) are limited to N2 applications only.

Ensure batten and fastener spacing are in accordance with the wind zone requirements in Table 6 below.

Table 6 - Batten and fastener spacing requirements for NCC compliance

WIND CLASSIFICATION (AS 4055)	DESIGN ULTIMATE WIND PRESSURE AS/NZS 1170.2 (kPa)		MAX. STUD/ BATTEN SPACING (MM)	NUMBER OF FASTENERS PER PANEL IN EACH BATTEN	
	WITHIN 1.2M OF CORNERS	AWAY FROM CORNERS		WITHIN 1200MM FROM CORNERS	OVER 1200MM OF CORNERS
N1, N2, N3, C1	1.05/-1.95	1.05/-0.98	600	2[1]	2[1]
N4, C2	1.56/-2.90	1.56/-1.45	600	3	2[1]
N5, C3	2.30/-4.27	2.30/-2.14	450	3	3

Notes: Where panels are not supported at their base (e.g. slab edge or shelf angle), increase the Number of Fasteners Per Panel in each batten to 3.

Reference AS 5146.3 Tables 3.3(G), (H) & (I).

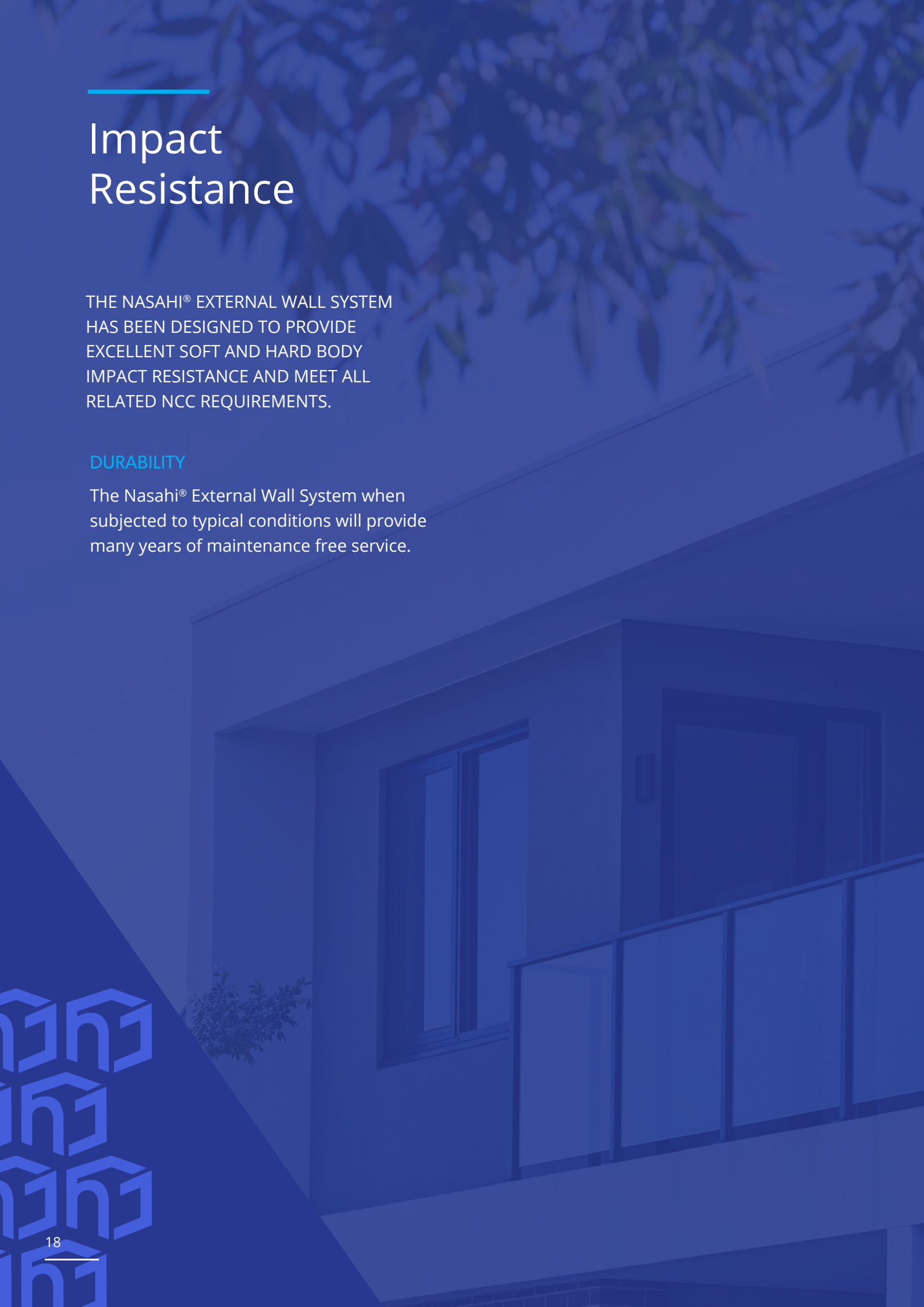
Reference Document: Ian Bennie & Associates, Test Report No's. 2018-084-S1 & S2, Dated 7th September 2018.

Impact Resistance

THE NASAHI® EXTERNAL WALL SYSTEM HAS BEEN DESIGNED TO PROVIDE EXCELLENT SOFT AND HARD BODY IMPACT RESISTANCE AND MEET ALL RELATED NCC REQUIREMENTS.

DURABILITY

The Nasahi® External Wall System when subjected to typical conditions will provide many years of maintenance free service.



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, and in the event of fire Nasahi® Panels do not emit toxic gases or vapours.

The Nasahi® External Wall System meets the performance requirements of the NCC, providing a Fire Resistance Level (FRL) of up to 120/120/120 using standard 10mm plasterboard internal lining.

EXTERNAL WALL FIRE RESISTANCE LEVELS (FRL)

Refer to Table 7 below:

Table 7 - External Wall Fire Resistance Levels (FRL), from outside direction only. (Refer to Table 7A for two-way FRL system configurations).

REQUIREMENT FOR EXTERNAL WALLS					
EXPOSED SIDE CLADDING	**BATTEN***	**WALL FRAMING**	**UNEXPOSED SIDE CLADDING**	**FRL**	**IMPOSED FIRE DESIGN LOAD (AS 1170.0 CLAUSE 4.2.4)**
Min. 50mm thick Nasahi® Super50 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
	Timber batten			90/90/90	
	Foam PVC or Polystyrene			60/60/60	

** Refer System Components Page 33 for batten options.*

Reference Document: Warringtonfire Australia, Fire Assessment Report No. 38259000 R6.3, Dated 3rd November 2021.

Table 7A - 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) • H-Grade EPS Battens • Min 70mm deep timber or min 76mm deep steel stud wall framing • Internal plasterboard*	**60/60/60**	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) • H3 Treated Pine Timber battens. • Min 70mm deep timber or min 76mm deep steel stud wall framing • Internal plasterboard*	**90/90/90**	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 70mm deep timber or 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. 70mm deep timber or 76mm deep steel stud wall framing. • Internal Lining*	**120/120/120**	Nasahi® Panel (50mm, 62mm or 75mm)	120/120/120

Notes:

1. Nasahi® do not specify the construction of the framing or the internal lining. The internal lining in particular will have specific installation instructions to meet FRL Requirements. This is not addressed in the External Wall Manual.

2. For exposure from internal (plasterboard) side: The stud spacing must not exceed 450mm. Timber stud width must not be less than 45mm. Steel Stud BMT must not be less than 0.75 mm.

Reference Document:

1. Warringtonfire Australia, Fire Assessment Report No. 38259000 R6.3, Dated 3rd November 2021.

BUSH FIRE ZONE COMPLIANCE

The Nasahi® External Wall System has been designed to comply with all six Bush Fire Attack Level categories (BAL) in the NCC. Bush Fire Zones are defined as:

Table 8 - Bush Zone Compliance

BAL	DESCRIPTION	REQUIREMENT FOR EXTERNAL WALLS	NASASHI®
Low	Minor attack from radiant heat and flame. Some attack by burning debris possible.	No special construction requirements.	✓
12.5	Significant attack by burning debris. Radiant heat not greater than 12.5kW/m^2.	Non-combustible wall material required up to 400mm above ground or decks. Ember ingress protection required.	✓
19	Significant attack by burning debris. Radiant heat not greater than 19kW/m^2.	Non-combustible wall material required up to 400mm above ground or decks. Ember ingress and radiant heat protection required.	✓
29	Significant attack by burning debris. Radiant heat not greater than 29kW/m^2. Some flame contact is possible.	Non-combustible wall material required. Ember ingress and radiant heat protection required.	✓
40	Radiant heat levels and flame contact is likely to significantly threaten building integrity.	Non-combustible wall material required or tested for bushfire resistance to AS1530.8.1.	✓
FZ (Flame Zone)	Significant radiant heat and high likelihood of flame contact from the fire front threatening building integrity.	Non-combustible material with a minimum thickness of 90mm; or FRL of -/30/30 when tested from outside; or tested for bushfire resistance to AS1530.8.2	✓

Note: In bushfire applications, panels must not be installed in a manner that allows debris to accumulate underneath the panel. Burning ember ingress into the cavity must be prevented in accordance with NCC and AS3959 requirements.

Energy Efficiency

THE NASAHI® EXTERNAL WALL SYSTEM HAS BEEN DESIGNED TO ACHIEVE ENERGY EFFICIENCY LEVELS THAT COMPLY WITH THE CLIMATE ZONE REQUIREMENTS OUTLINED IN THE NCC.

This exceptional level of performance is due to the aeration within the Nasahi® Panels providing very high levels of thermal resistance.

Table 9 - NCC 2019 (Amdt. 1) External Wall Total R-Value Requirements by Climate Zone (Thermally bridged values)

CLIMATE ZONES	1,2,3,4,5	6,7	8
Minimum Total R-Value for External Walls	Typical wall – R2.8 Shaded with a minimum projection angle of: 15 degrees – R2.4	Typical wall – R2.8	Typical wall – R3.8

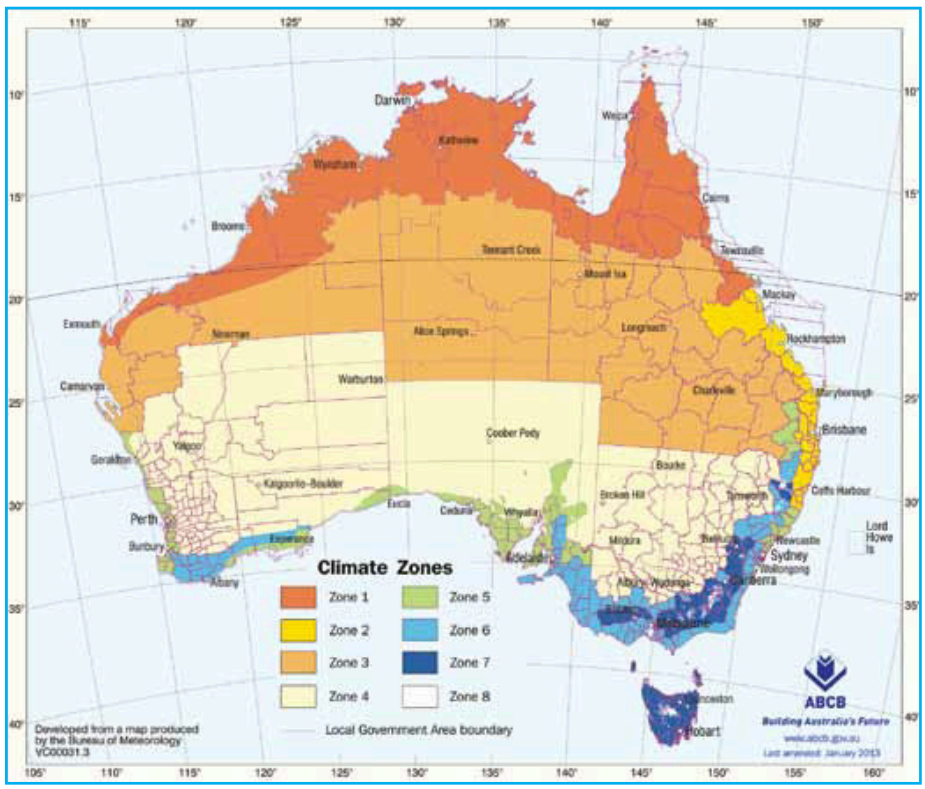


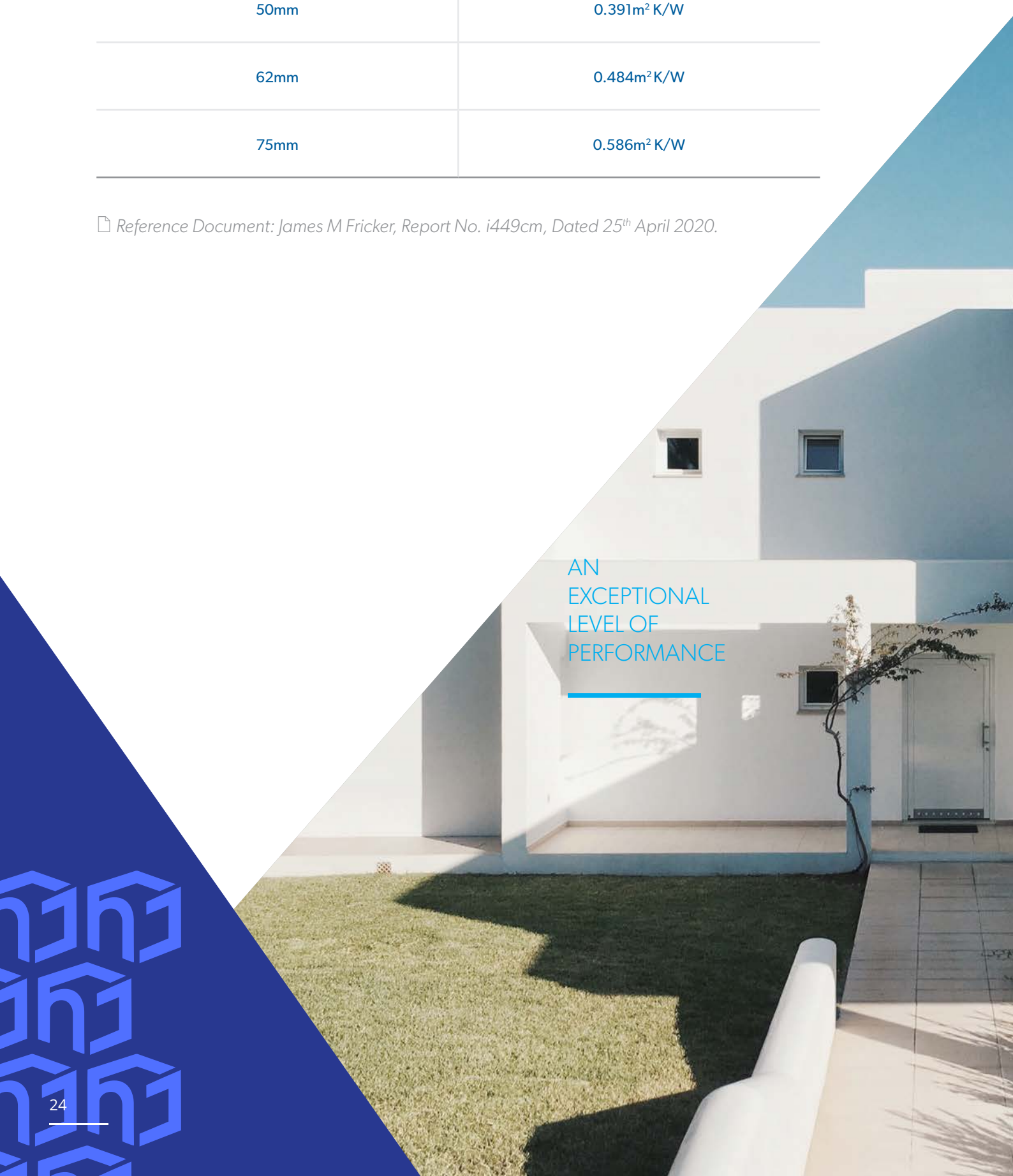
Image sourced from the Australian Building Codes Board (ABCB) www.abcb.gov.au

CLIMATE ZONE COMPLIANCE

Table 10 - Nasahi® Bare Panel Thermal Rating

PANEL THICKNESS	R VALUE
50mm	0.391m² K/W
62mm	0.484m² K/W
75mm	0.586m² K/W

Reference Document: James M Fricker, Report No. i449cm, Dated 25th April 2020.



AN EXCEPTIONAL LEVEL OF PERFORMANCE

THERMAL INSULATION COMPLIANCE

The Table below presents Total R-values in accordance with AS/NZS 4859.1 incorporating the effects of thermal bridging. These values are equally applicable to all building types.

Table 10A - Nasahi® System R-Values.

NASAHI® PANELS THICKNESS (MM)	BATTEN DEPTH (MM)	STRUCTURAL FRAME		BULK INSULATION (R-VALUE)	INTERNAL LINING	TOTAL R-VALUE (THERMALLY BRIDGED) (M^2.K/W)	
		TYPE & SPACING	STUD SIZE			WINTER	SUMMER
50 & 62	16, 24 or 35	Timber at 600cts	70x35	-	10mm plasterboard	R1.49	R1.44
			90x45	R2.00		R2.66	R2.51
				R2.50		R3.01	R2.87
				R3.00		R3.33	R3.22
75			70x35	-		R1.68	R1.65
			90x45	R2.00		R2.87	R2.72
				R2.50		R3.23	R3.09
				R3.00		R3.56	R3.44
50 & 62	16, 24 or 35	Timber at 490cts	70x35	-	10mm plasterboard	R1.48	R1.44
			90x45	R2.00		R2.61	R2.47
				R2.50		R2.94	R2.81
				R3.00		R3.23	R3.13
75			70x35	-		R1.68	R1.65
			90x45	R2.00		R2.82	R2.68
				R2.50		R3.16	R3.03
				R3.00		R3.46	R3.35
50 & 62	16, 24 or 35	Steel at 600cts	76x35x0.55BMT	-	10mm plasterboard	R1.39	R1.35
			92x45x0.55BMT	R2.00		R2.24	R2.13
				R2.50		R2.48	R2.38
				R3.00		R2.69	R2.61
75			76x35x0.55BMT	-		R1.59	R1.56
			92x45x0.55BMT	R2.00		R2.51	R2.39
				R2.50		R2.78	R2.67
				R3.00		R3.02	R2.93
50 & 62	16, 24 or 35	Steel at 450cts	76x35x0.55BMT	-	10mm plasterboard	R1.37	R1.33
			92x45x0.55BMT	R2.00		R2.15	R2.05
				R2.50		R2.35	R2.27
				R3.00		R2.35	R2.46
75			76x35x0.55BMT	-		R1.58	R1.55
			92x45x0.55BMT	R2.00		R2.42	R2.31
				R2.50		R2.66	R2.56
				R3.00		R2.86	R2.79

Reference Document: James M Fricker, Report No. i449cm, Dated 25th April 2020.

Condensation Management

IN ORDER TO COMPLY WITH THE NEW CONDENSATION REQUIREMENTS IN THE NCC 2019, NASAHI® HAS APPOINTED FABRIC FIRST TO UNDERTAKE HYGROTHERMAL ASSESSMENT ON OUR NASAHI® EXTERNAL AND BOUNDARY WALL SYSTEMS.

To address the performance requirement P2.4.7, hygrothermal modelling (in line with V2.4.7 verification condensation management) has been undertaken to determine the risks associated with water vapour and potential condensation to minimise their impact on health of occupants.

Nasahi® carried out assessments on a typical 3-bedroom home of 312.5m^3 or 125m^2 for Climate zones 1,2,3,5,6 and 7.

No risk levels where determined, and the External and boundary wall systems satisfy condensation management requirements. Further to this the Boundary wall system does not include a vapour permeable membrane (class 3 or 4) and its omission will not cause any additional risk of condensation as the wall exterior is not exposed. However, on External walls a vapour permeable membrane must always be installed.

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

Acoustic Performance

THE NASAHI® EXTERNAL WALL SYSTEM HAS BEEN DESIGNED TO PROVIDE EXCELLENT ACOUSTIC PERFORMANCE.

Sound insulation materials can be incorporated into the system to significantly increase the acoustic performance against outside noise.

A complete listing of Nasahi® External Wall System acoustic performance may be found on our website.

A 10db increase in acoustic performance is approximately equivalent to a halving of loudness.

Table 11 - Typical Acoustic Performances of External Walls

DESCRIPTION	SYSTEM THICKNESS (MM)	ACOUSTIC PERFORMANCE Rw+Ctr
Nasahi® 50mm External Wall System, 4mm render, 16mm Batten, 90mm timber frame, R2 Insulation, 10mm Plasterboard.	170	43
Brick veneer, Timber Frame and Internal Plasterboard	250	50
Rendered EPS, Timber Frame and Internal Plasterboard	174	29
Weatherboards and 120mm mineral wool insulation	120	23

Note: Exact acoustic performance of the external wall system is dependant on the specification of the products used.

Reference Document: Renzo Tonin & Associates, Acoustic Opinions Report No. TH736-01F02 R8, Dated 16th April 2020.

Weatherproofing

BREATHABLE WALL WRAP

Breathable wall wrap in accordance with AS/NZS 4200.1:2017 must be used with the Nasahi® External Wall System to ensure a cavity is maintained between the Nasahi® Panel and insulation, which further improves the energy efficiency of the system.

The breathable wall wrap must be a vapour permeable membrane and installed in accordance with AS 4200.2:2017 including taping at all joins and edges.

The Nasahi® External Wall System meets the performance requirements of the NCC. In the event that water enters the wall cavity, the system is designed to allow excess moisture present to be dissipated without causing permanent damage to the building elements.

The system is designed with four layers of defense to prevent moisture entry into the habitable space:

- External Coating
- Nasahi® Panel
- Internal Cavity
- Breathable Wall Wrap

Note: External Coatings and Wall wraps are not required for Boundary Wall applications for up to N2 wind classifications. Ensure the Boundary Wall is weatherproofed at the top, bottom and sides.

Sealants

All control Joints must be sealed with a suitable external grade acoustic and/or fire rated paintable sealant. All gaps between the Nasahi® panels and framing around the windows and doors must be sealed.

Minimum 2 hour fire rating caulking should be used for fire rated applications. Breathable wall wrap must be installed in accordance with AS 4200.2:2017 including taping at all joins and edges.

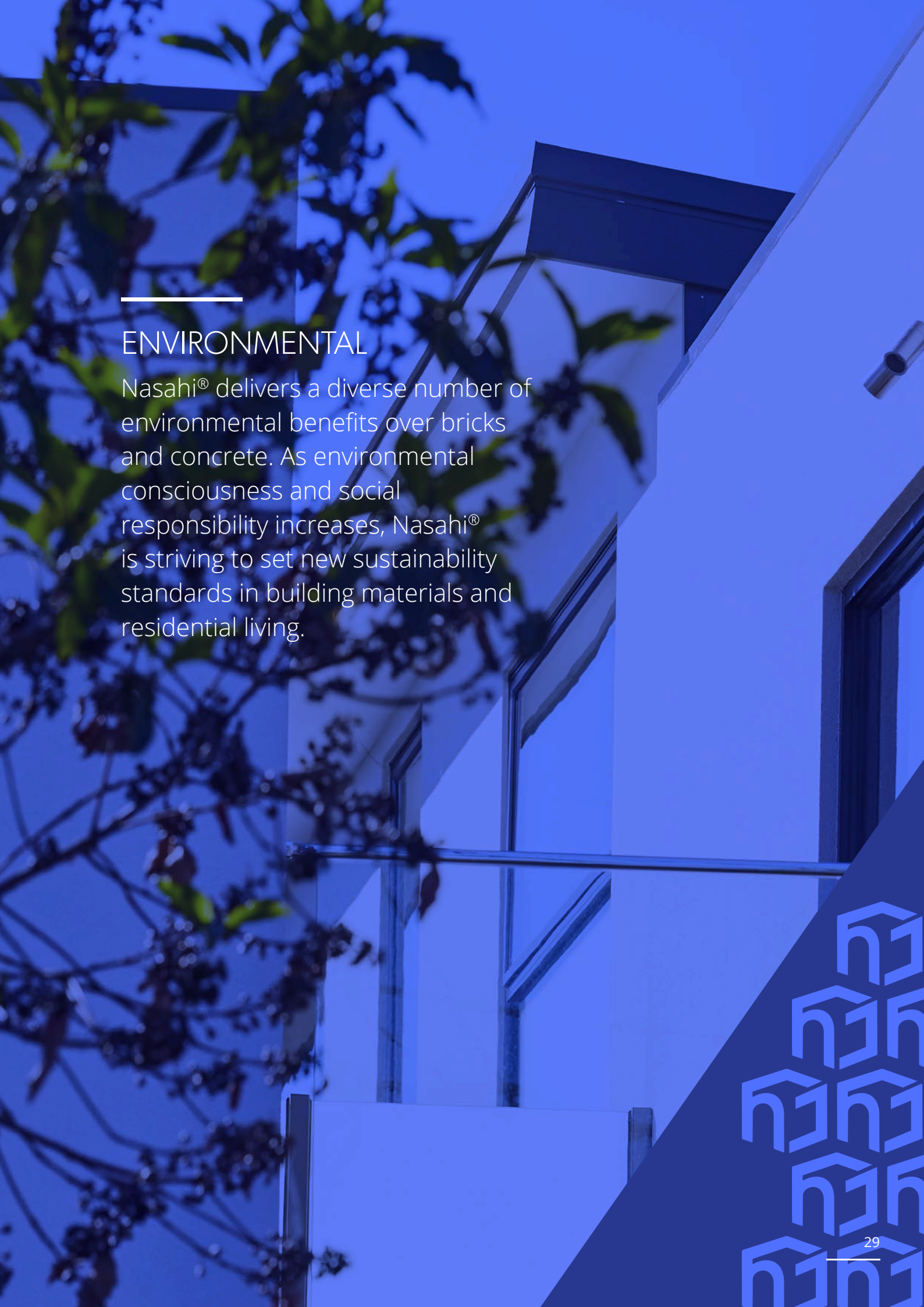
Wall Flashings

Flashings shall be designed and installed in accordance with SAA-HB39 2015- Installation Code for Metal Roofing and Wall Cladding.

Penetrations

Penetrations must be sealed and flashed in accordance with the Nasahi® construction details provided, and the NCC. It is the responsibility of the project engineer to verify that all non-standard installation details will meet the performance requirements of the NCC.

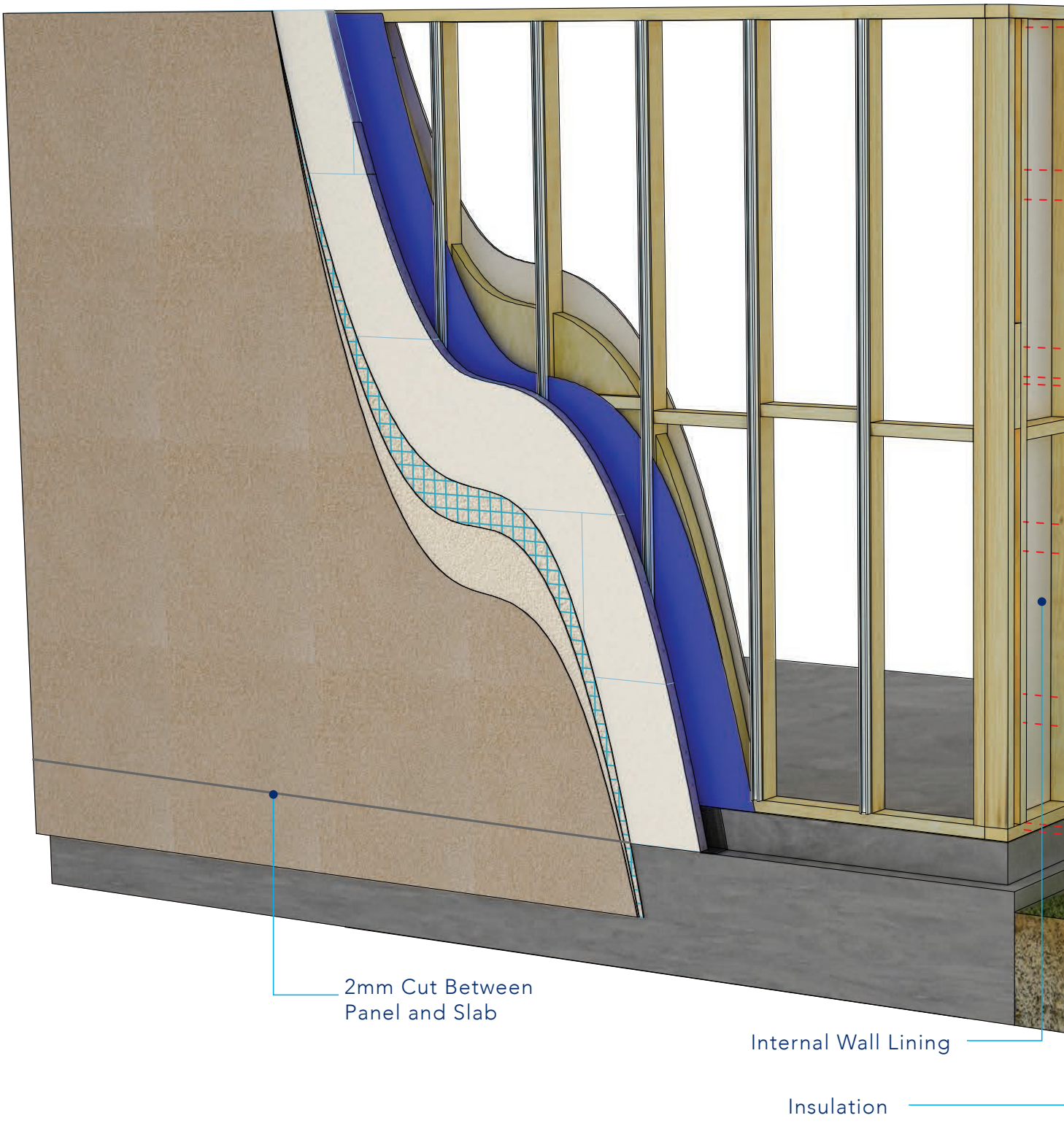
In the event of a Boundary Wall System (with no penetrations) abutting the boundary wall of an adjoining property that cannot be coated, the uncoated Boundary Wall System must be installed with a drained cavity between abutting walls, and be weatherproofed at the top and sides, as shown in details 13.1 & 13.2 on Page 59.

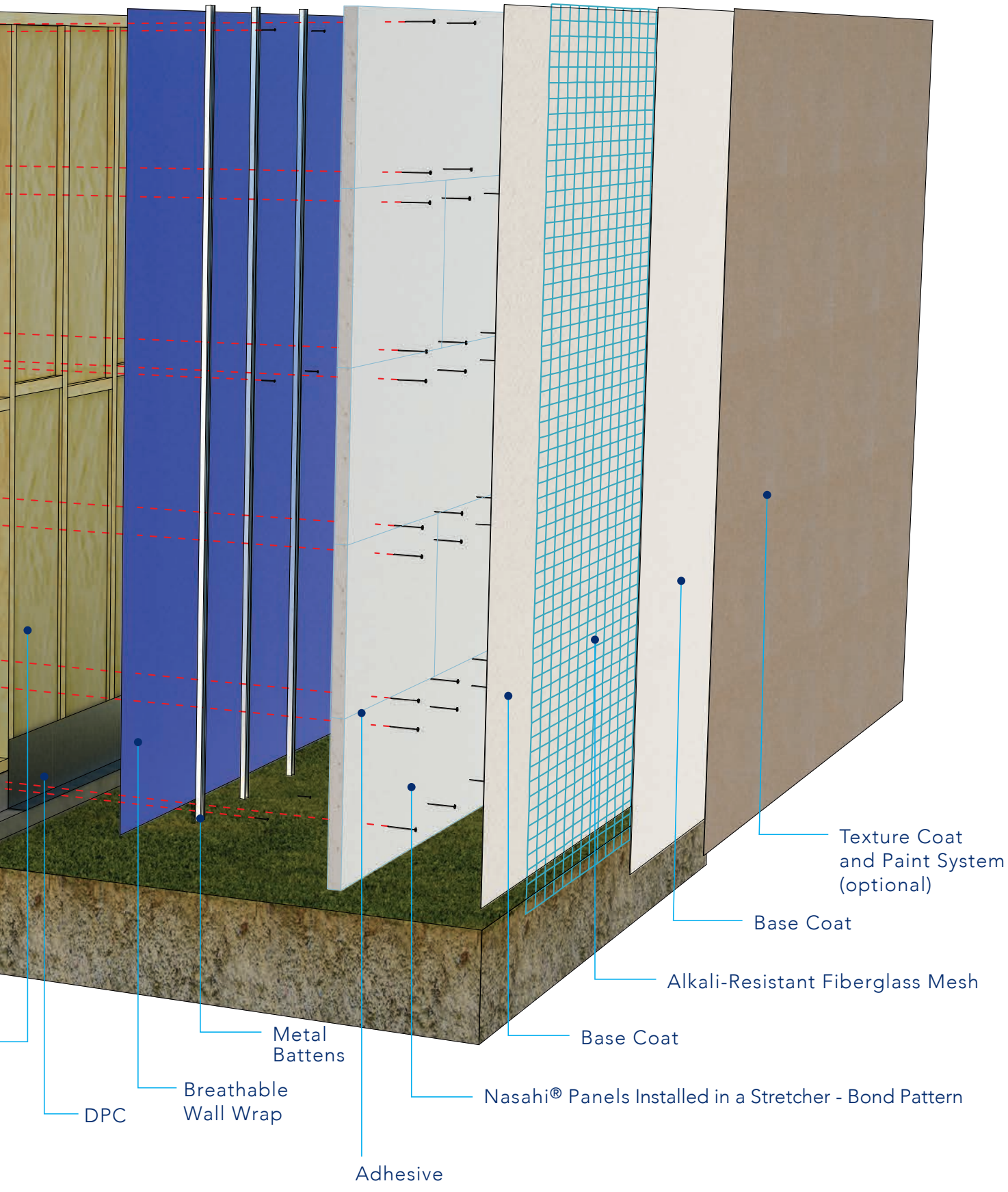


ENVIRONMENTAL

Nasahi® delivers a diverse number of environmental benefits over bricks and concrete. As environmental consciousness and social responsibility increases, Nasahi® is striving to set new sustainability standards in building materials and residential living.

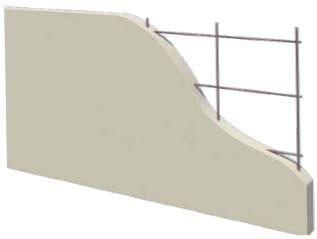
Nasahi® External Wall System Overview

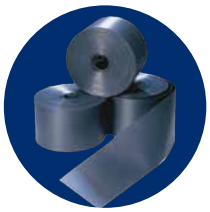



Texture Coat
and Paint System
(optional)
Base Coat
Alkali-Resistant Fiberglass Mesh
Base Coat
Nasahi® Panels Installed in a Stretcher - Bond Pattern
Adhesive
Breathable
Wall Wrap
Metal
Battens
DPC

External Wall System Components

Table 13 - System Components for Timber 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 a length of 2200mm. For longer Panels please call Nasahi®.

DPC

Damp-Proof Courses must comply with AS2904, and be installed in accordance with NCC requirements. DPC shall be located below the AAC Panel on the lowest floor. Alternatively it could be on every floor.

PANEL FASTENERS

Panel fasteners must penetrate through the cavity battens, and into the wall frame by a minimum of 30mm for timber frames and a minimum of 15mm for metal frames.

Timber Frames

Bugle Batten Head Type 17, 14-10 Class 3 Screws

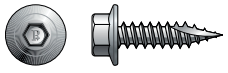
Steel Frames

Hex Head Self-Drilling 14-10, 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.

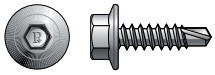
BATTEN FASTENERS

Cavity batten fasteners are used to temporarily support the battens in place during system installation.



Timber Frames

12-11 x 25mm Hex Head Type 17 Class 3 screws



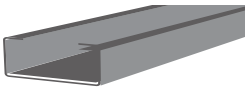
Steel Frames

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

BATTEN CLIP

For Boundary Wall applications.

314 Rondo Direct Fix Clip



METAL BATTENS

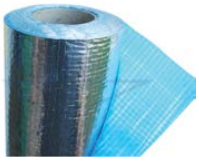
Nasahi® Steel Cavity Battens:

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

Other Batten Options:

TYPE	MIN. WIDTH	MAX. HEIGHT
H3 Treated Pine Timber Batten	35mm	45mm
H Grade EPS Batten	35mm	50mm

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



BREATHABLE WALL WRAP

The breathable wall wrap material must be in accordance with AS/NZS 4200.1:2017 with water barrier and vapour permeable (breathable) classifications and installed in accordance with AS 4200.2:2017.

INSULATION

Provided 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.

ADHESIVE

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

WEEP HOLES

Weep holes can be used to create additional ventilation/ drainage for the system to get rid of any water that has penetrated the outer wall skin or surface. An approved Weepa slot or small breaks (10mmx50mm) in the caulking at max 1200mm centres to be formed. For non-combustible construction ensure either a fire rated caulked slot or stainless steel slot is used.

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.

External Wall System Installation Sequence

STAGE 1: PREPARATION

1. The wall frame and roof must be completed prior to installation of the Nasahi® External Wall System. A pre-installation check list is available on our website.

2. Damp-Proof Course must comply with AS2904, and be installed in accordance with NCC requirements. DPC shall be located below the AAC Panel on the lowest floor. Alternatively it could be on every floor.

3. Use a straight edge to ensure framing is straight. Pay particular attention to corner studs that they are straight and plumb.

4. Install wall wrap in accordance with AS4200.2.

STAGE 2: BATTEN INSTALLATION

5. Attach battens vertically to each stud. Batten spacing must comply with the structural requirements for the Wind Zone of the project; refer to Table 6 on Page 17 or Details on Page 35.

6. Flashings must be installed around penetrations in accordance with NCC requirements and the detail drawings.

STAGE 3: NASAHI® PANEL INSTALLATION

7. Starting at a corner, rest the Nasahi® Panel on the slab rebate, push the panel horizontally hard up against the battens;

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

9. Screw fix through the exterior face of the Nasahi® Panel, through the batten and into the frame. Fixing spacing must comply with Table 6 on Page 17 or Details on Page 49. Screws must be a minimum of 100mm in from the panel edge.

10. The screw head must penetrate 5-10mm into the panel face.

11. Nasahi® Panels can be cantilevered a max of 500 mm between stud. If panels are misaligned use back blocking as per Detail 11.2 Page 57.

STAGE 4: PANEL ADHESIVE

12. Apply approximately 2-3mm thick Panel Adhesive to vertical edge of the panel. Install the next panel ensuring it is level and join is fully sealed.

13. Screw fix panel as per Step 9 above.

14. Repeat around the perimeter of the building.

15. Apply approximately 2-3mm thick Panel Adhesive to the horizontal top edge of the panel.

16. 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. Patch all screw heads with Nasahi® Adhesive.

17. If panels are cut to length, ALL exposed steel reinforcement must be treated with Nasahi® Anti-Corrosion Touch up Paint.

18. Penetrations and Services must be sealed in accordance with the Plumbing and Electrical Service Section on Page 12.

19. Upon project completion the installer and renderer must both complete a Nasahi® Compliance Certificate and submit to both the builder and Nasahi®.

1. BREATHABLE WALL WRAP

- Install DPC and Wall Wrap in accordance with AS4200.2:2017.
- Wall wrap overlaps must be taped around penetrations and the perimeter.


2. CAVITY BATTENS

- Install Nasahi® Cavity Battens and vermin control strip (required in suspended applications refer Pages 50 and 51)
- Determine required batten spacing for wind zone and layout using Table 6 on Page 17 or Details on Page 49.


3. PANEL

- Install Nasahi® Panel
- Start at one corner, finish bottom row first making sure panels are level.
- Fixings as per Table 6 on Page 17 or Details on Page 49.


4. ADHESIVE

- Apply panel adhesive to vertical and horizontal joints. Patch all screw heads with Nasahi® Adhesive.
- Install next row in Stretcher-Bond pattern. Minimum panel stagger 275mm.
- Treat all exposed reinforcement mesh with Nasahi® Anti-Corrosion Touch up Paint.


5. EXTERNAL COATING

- Apply a Nasahi® Approved External Coating System.
- (Refer to Specification on Pages 14 and 15).


Boundary Wall System Installation Sequence (Stand-up Frame Method)

STAND UP FRAME METHOD (NASAHI® PANELS FIXED TO EXISTING BUILDING)

This method is limited to AS4055 N2 wind classification only AND MAY only be used when builder is constructing adjoining properties consecutively or permission to fix to existing wall is granted by adjoining neighbour.

1. Fix temporary batten (minimum 20mm thick) to the external face of Wall 1.

2. Begin Wall 2 construction by temporarily fixing the Nasahi® Panels through the temporary batten and into the existing wall. Ensure 2-3mm Nasahi® adhesive is applied at all joints. These fixings must be removed and screw holes patched once Frame 2 is installed. When using EPS battens as a temporary batten, the temporary batten may remain in the cavity but fixings must be removed and screw holes patched.

3. Prop the Nasahi® Panels as required until Frame 2 is installed.

4. Construct Wall 2 frame flat on the ground.

5. Prepare frame 2 for fixing to Nasahi® Panel by Fixing 16mm galvanised Steel Battens on wall 2 at max. 600mm centres using 12G x 45mm Hex Head Screws. Stand up frame 2 against the steel battens, and using a Rondo 314 clip attach the battens to the frame using Batten Clip fasteners (shown below) into the top plate, nogging and bottom plate.

6. Ensure temporary fixings holding Wall 2 to existing wall, and temporary battens are removed once Frame 2 is installed.

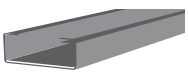
7. Patch all screw holes in Wall 2 and patch screw heads with Nasahi® Adhesive.

8. A minimum of 135mm step-down and capping over the completed wall cavity is mandatory as per Details 13.1 and 13.2 on Page 59.

BOUNDARY WALL SYSTEM COMPONENTS

Panel Fastener

12-11 x 45mm
Hex Head Type 17
Screw Class 3



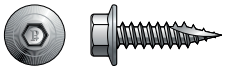
Batten

16mm Galv.
Batten
0.45BMT x 3m

Batten Clip

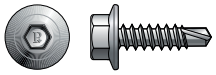
314 Rondo
Direct Fix
Clip

Batten Clip Fastener:



Timber Frames

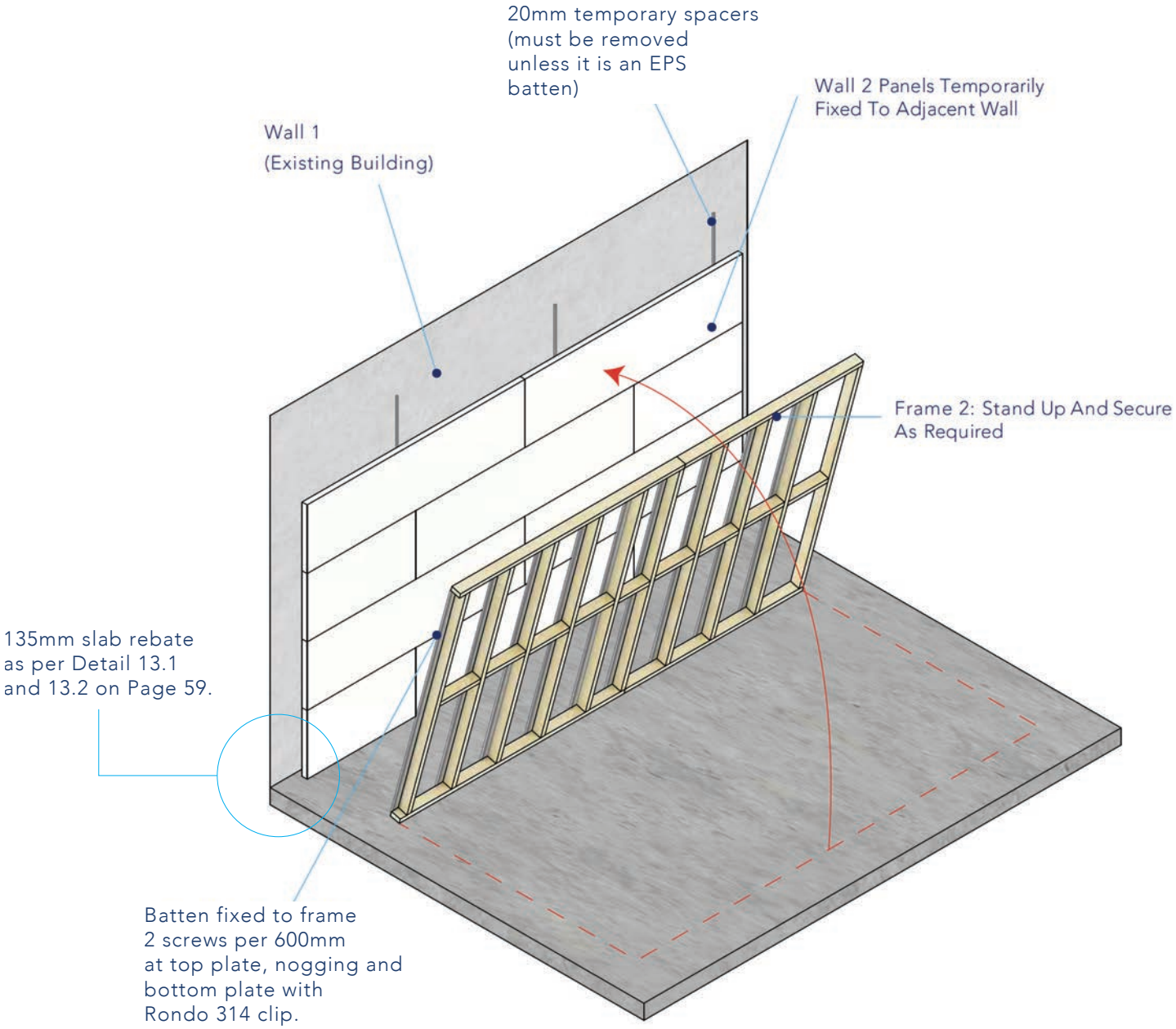
12-11 x 25mm
Hex Head Type 17
Class 3 screws



Steel Frames

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

BOUNDARY WALL OPTION A (STAND -UP FRAME METHOD)



Wall 1

Wall 1 is to be installed as per the External Wall Installation sequence on Page 34 and using the External Wall System Components on Pages 32 and 33.

Wall 2

Wall 2 is to be installed as per Boundary Wall Installation Sequence (Stand-up Frame Method) and using the Boundary Wall System Components on Page 36.

Boundary Wall System Installation Sequence (Slide-in Panel Method)

SLIDE PANEL METHOD (NASAHI® PANELS NOT FIXED TO EXISTING BUILDING)

1. Construct Frame 2 for fixing to Nasahi® Panel: Once the frame is constructed, install 16mm Steel Galvanised battens at a max. 600mm centres with 314 Rondo clips fixed to top plate, nogging and bottom plates using batten clip fasteners (shown below). Ensure there is at least 50mm clearance between external panel face and existing building (minimum 115mm from frame 2 to the face of wall 1).

2. Slide Nasahi® Panels into the wall cavity from one end and fix to 16mm Steel Galvanised battens using the 12g x 45mm Hex head screws. 2 screws per batten, per panel height (100mm from the top & bottom edge). Ensure 2-3mm Nasahi® adhesive is applied at all joints.

3. Panels on a boundary wall shall be installed in a stretch-bond (stagger) configuration see Page 52 Panel Layout Guideline.

4. Capping over the wall cavity is mandatory as per Detail 13.1, 13.2 on Page 59.

5. A minimum of 135mm step-down and capping over the completed wall cavity is mandatory as per Detail 13.1, 13.2 on Page 59.

BOUNDARY WALL SYSTEM COMPONENTS

Panel Fastener

12-11 x 45mm Hex Head Type 17 Screw Class 3

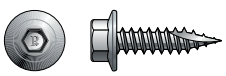
Batten

16mm Galv. Batten 0.45BMT x 3m

Batten Clip

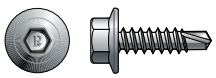
314 Rondo Direct Fix Clip

Batten Clip Fastener:



Timber Frames

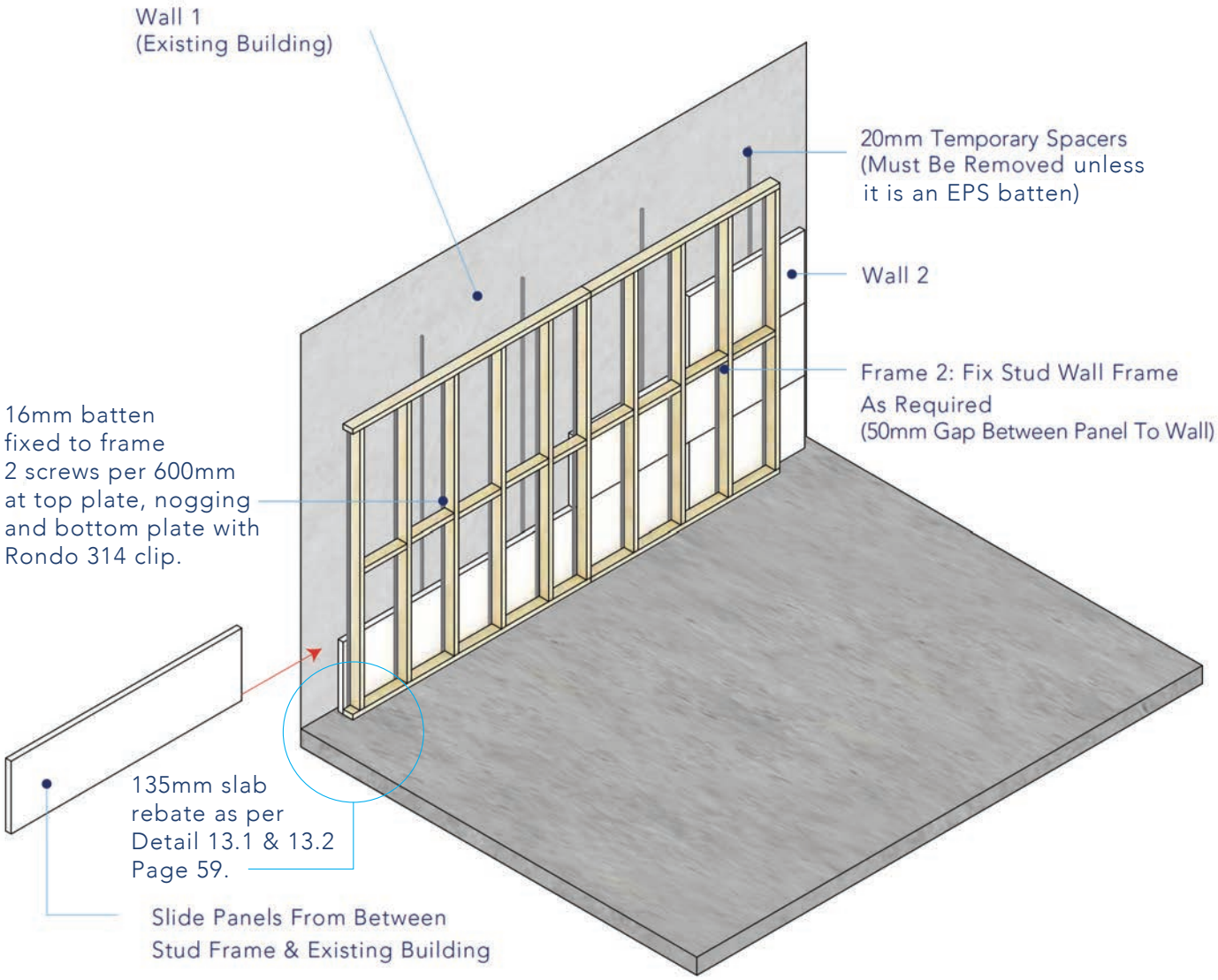
12-11 x 25mm Hex Head Type 17 Class 3 screws



Steel Frames

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

BOUNDARY WALL OPTION B
(FRAME IN POSITION SLIDE-IN PANEL METHOD)



Wall 1

Wall 1 is to be installed as per the External Wall Installation Sequence on Page 34 and using the External Wall System Components on Pages 32 and 33.

Wall 2

Wall 2 is to be installed as per Boundary Wall Installation Sequence (Slide-In-Panel Method) and using the Boundary Wall system components on Page 38.

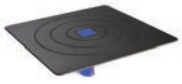
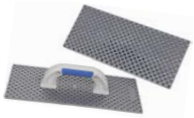
Working with Nasahi® Panels

CUTTING PANELS

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 13 - 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	

Delivery & Handling

DELIVERY

- Nasahi® Panels are delivered to site in flat packs of up to 20.
- 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 14 - Panel Packs and Weight

AL 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® 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.

NCC Compliance

CertMark International
CodeMark Australia
Certificate CM40326

NCC VOLUME ONE

Covers commercial, residential and public buildings defined as Class 2 to 9. Typical examples include multi-family dwellings, commercial, health buildings and anything not covered under Volume Two.

NCC VOLUME TWO

Covers domestic constructions defined as Class 1 and 10. Typical examples include single-family dwellings, townhouses, houses and garages.

It is the responsibility of the builder to ensure the system is designed in accordance with this installation manual and that all site-specific performance provisions outlined in the relevant sections of the NCC are met.

The Nasahi® External Wall System has been certified to meet the following provisions of the National Construction Code for Volume One and Volume Two as listed below:

Table 15 - NCC Compliance

	VOLUME ONE	VOLUME TWO
Structural	BP1.1(a),(b) & BP1.2	P2.1.1(a),(b) & (c)
Fire	C1.1, C1.9, C1.10, CP1*, CP2*, CP4* & CP8*	3.7.2.4(b), P2.3.1
Bushfire	G5.2	3.10.5.0(c)
Weatherproofing & Damp proofing	FP1.4 & FP1.5	P2.2.2 & P2.2.3
Acoustic	FP5.2 & FP5.5	P2.4.6
Energy Efficiency	J1.5	3.12.1.4
Condensation	FP 6.1	P2.4.7

Note:

** The Nasahi External Wall System contributes to compliance with the above performance clauses, however, may not provide complete compliance for your project.*

The Nasahi® CodeMark Certificate can be downloaded from our website www.nasahi.net.au Nasahi® have developed a Performance Based Design Brief (PBDB) Template for use by registered professionals. For a copy please email sales@nasahi.net.au or call 1300 26 27 24.

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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

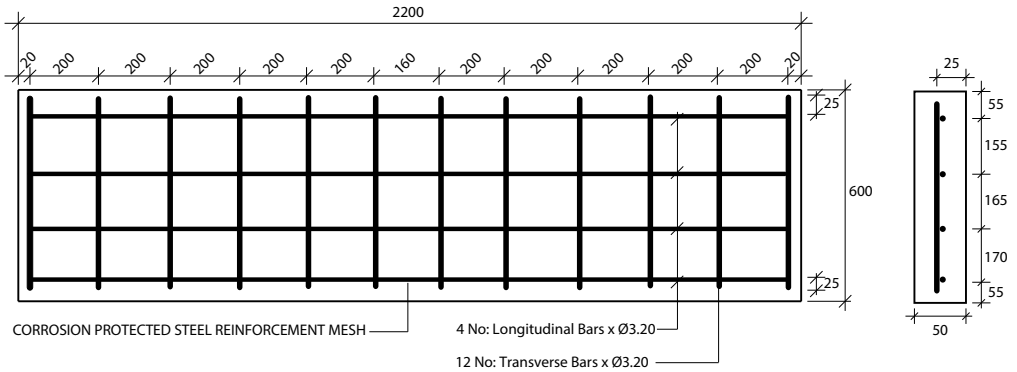
Note:

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

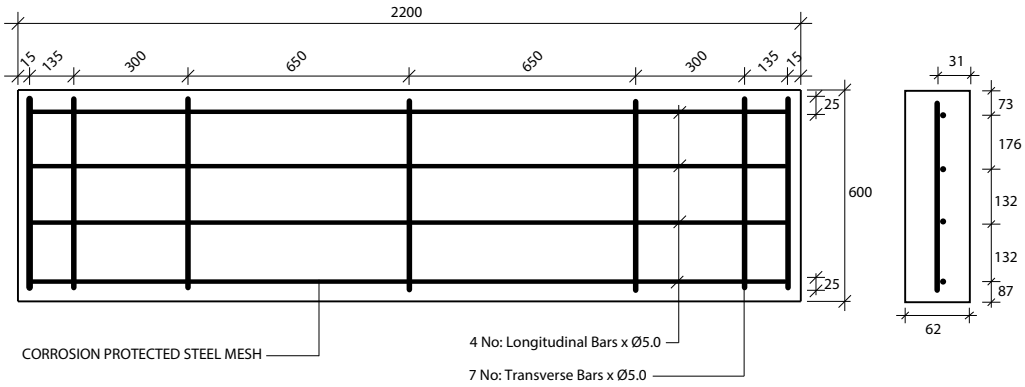
2. A design density of 590kg/m^3 has been calculated using a 12.4% moisture content.

PANEL REINFORCING LAYOUT

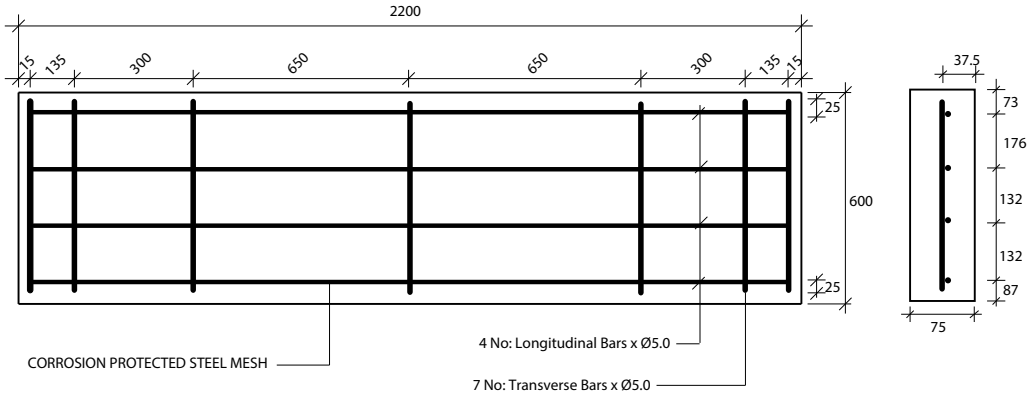
50MM THICK PANEL (50 X 600 X 2200)



62MM THICK PANEL (62 X 600 X 2200)



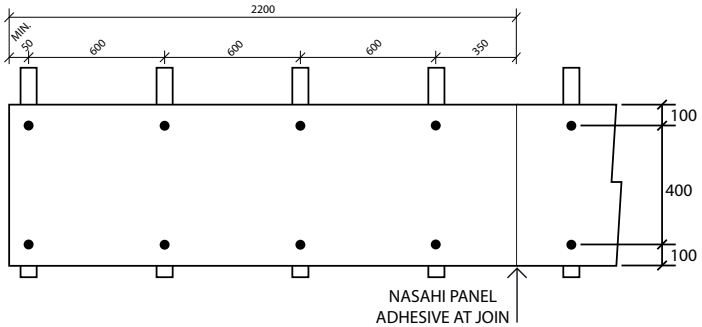
75MM THICK PANEL (75 X 600 X 2200)



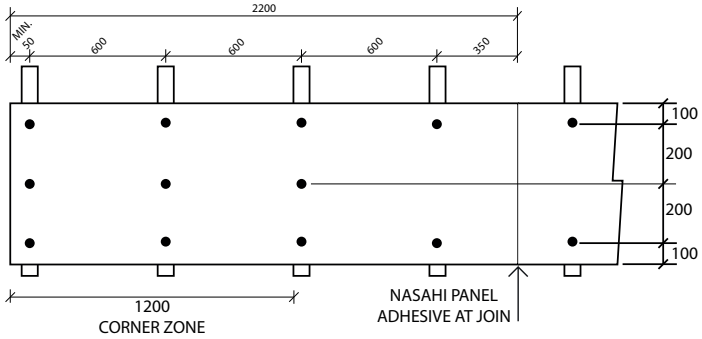
BATTEN AND FIXING REQUIREMENTS

600MM STUD CENTRES

WIND CLASS N1 TO N3 & C1



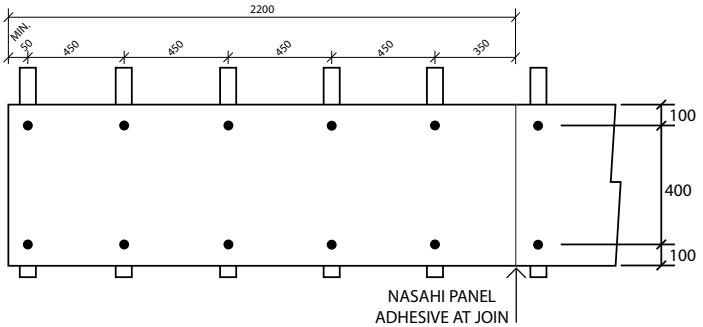
WIND CLASS N4 & C2



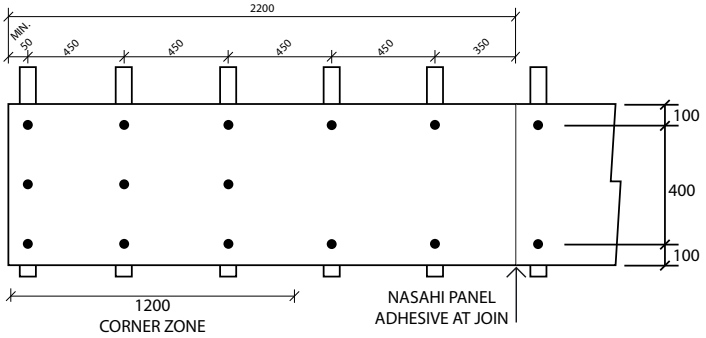
Note: Increase the number of fixing by 1 per batten in suspended applications.

450MM STUD CENTRES

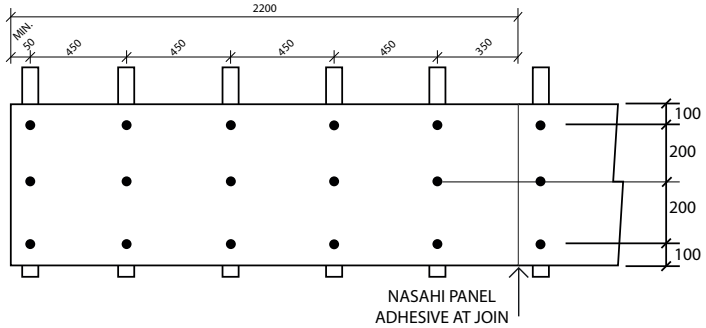
WIND CLASS N1 TO N3 & C1



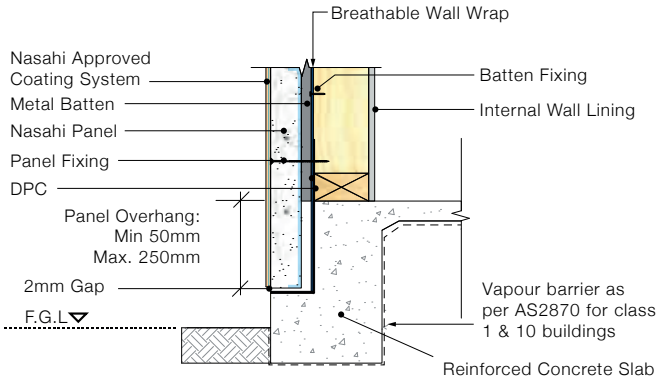
WIND CLASS N4 & C2



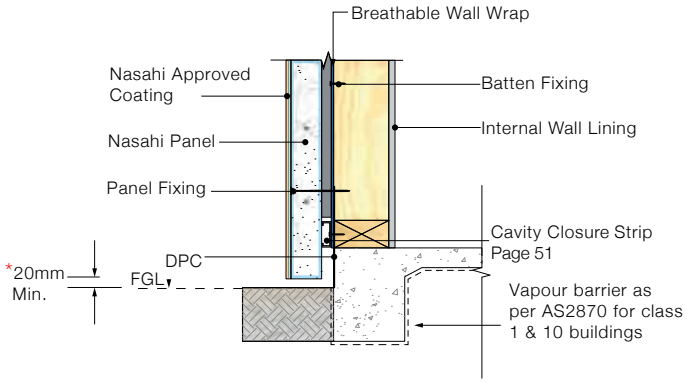
WIND CLASS N5 & C3



DETAILED DRAWINGS

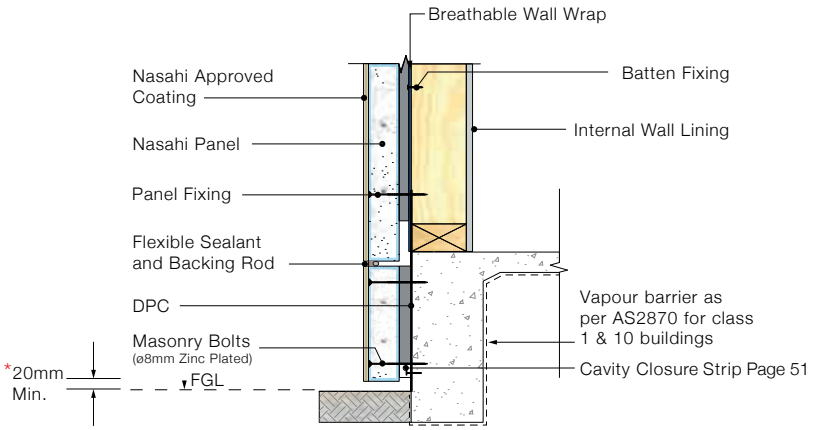


DETAIL 1.1 - Slab Edge Detail (Rebate)



DETAIL 1.2 - Slab Edge Detail (Overhanging)

Note: Increasing the number of fixings by one where the panels are not supported by the slab edge.



Note:

1. These details do not comply with termite visible inspection zone requirements. Alternative termite management systems must be used when selecting these details. It is the responsibility of the builder to provide a suitable physical or chemical barrier in accordance with AS 3660.

2. The minimum clearance between the underside of the Nasahi Panel to the finished ground level (FGL) maybe min. 20mm. or as per relevant authority requirements depending on finished surface type and application details (e.g., sheltering, and other project specific conditions). For more details, please contact Nasahi.

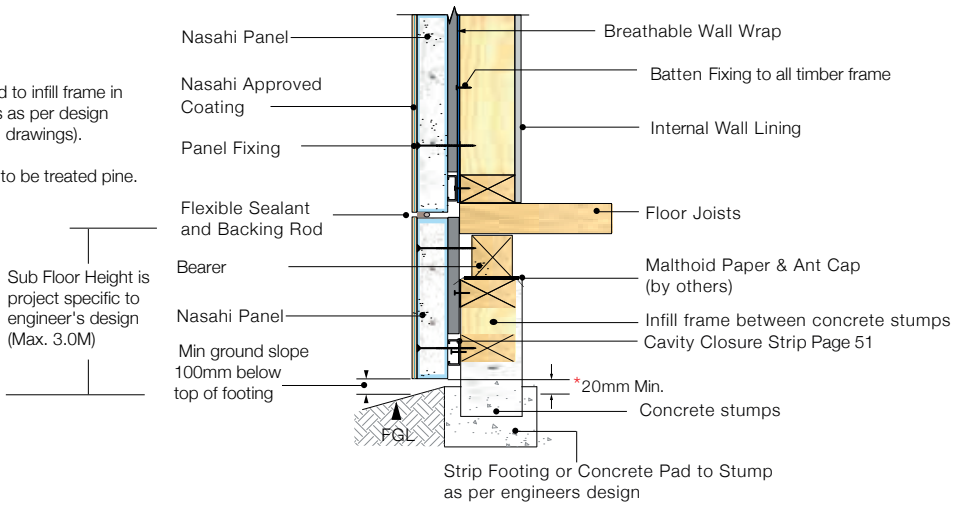
3. In all cases, adequate clearance shall be sufficient to provide coating to the underside of the panel.

DETAIL 1.3 - Slab Edge Detail (Overhanging Deepened Edge Beam) (Also for sliding door sill)

Note: Increase the number of fixings by one where the panels are not supported by the slab edge.

NOTE:
Subfloor panels to be fixed to infill frame in between concrete stumps as per design installation guide (Detailed drawings).

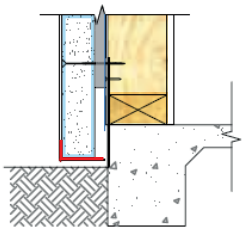
All framing in the subfloor to be treated pine.



DETAIL 1.3A Sub-floor Infill Between Stumps (Also for sliding door sill)

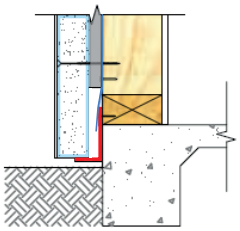
Note: Increasing the number of fixings by one where the panels are not supported by the slab edge.

CAVITY CLOSURE OPTIONS (VERMIN CONTROL STRIP)

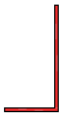


OPTION 1.

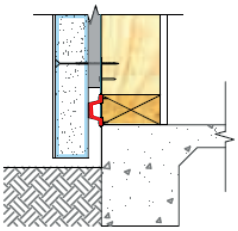
90° Aluminium Starting
Channel L Shape
(To Suit Cavity)
(Buildsmart Part No. 2089 or 2099)



OPTION 2.

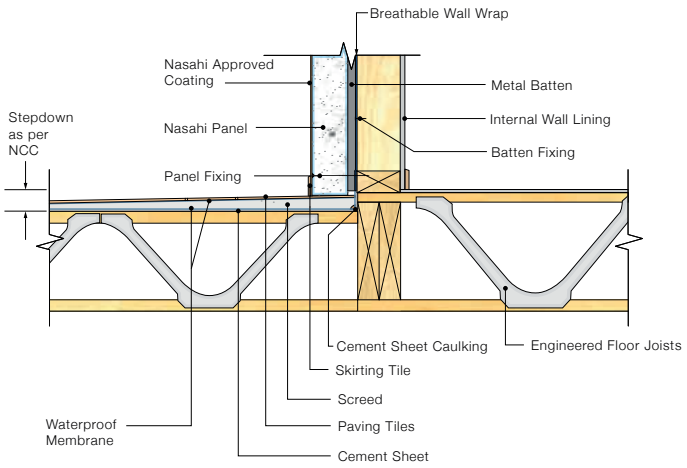


Aluminium Angle
(To Suit Cavity)

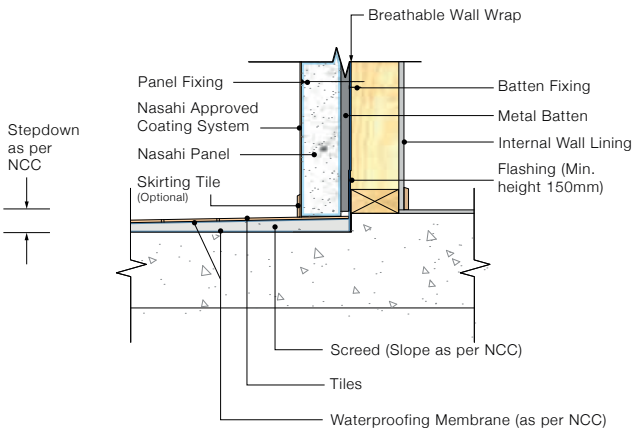


OPTION 3.

Top Hat Battens
(To Suit Cavity)

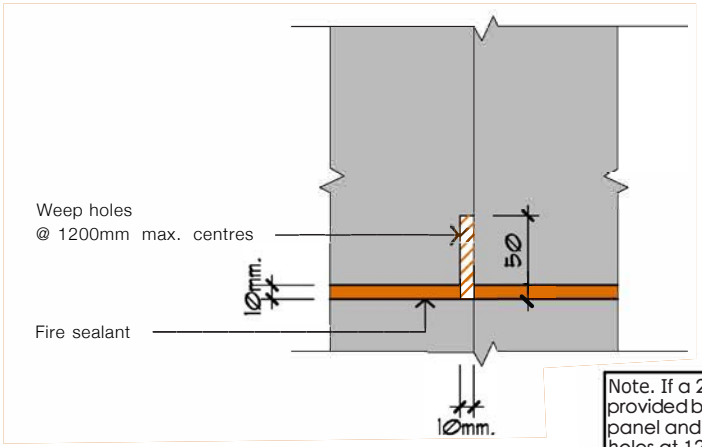


DETAIL 1.4 - Balcony Detail (Timber Frame)

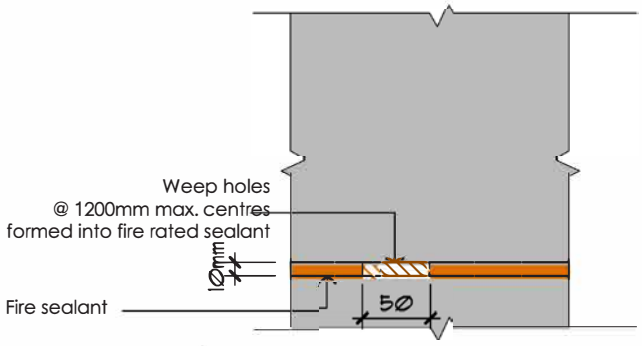


DETAIL 1.5 - Balcony Detail (Concrete Slab)

Note: On balconies if a 2mm cannot be provided between the bottom of panel and top of tile then weep holes at 1200 centres must be installed.



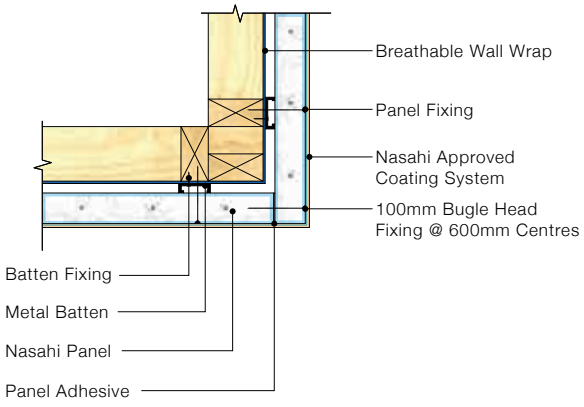
DETAIL 1.6



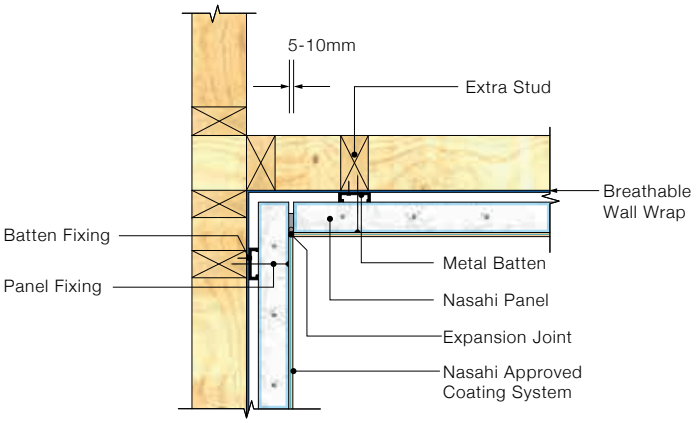
DETAIL 1.7

Note. If a 2mm gap cannot be provided between the bottom of panel and top of tile then weep holes at 1200mm centres must be installed.

DETAILED DRAWINGS

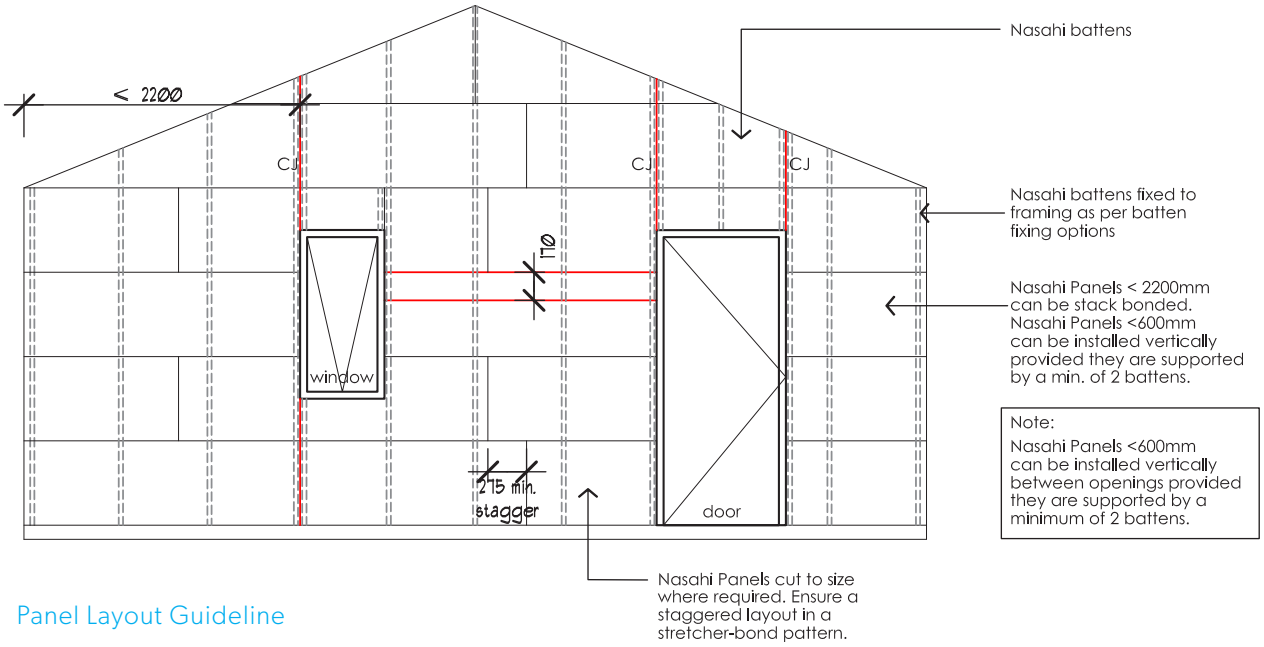


DETAIL 2.1 - External Corner Detail



DETAIL 2.2 - Internal Corner Detail

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



Panel Layout Guideline

Note:
It is possible to run a single panel vertically when:

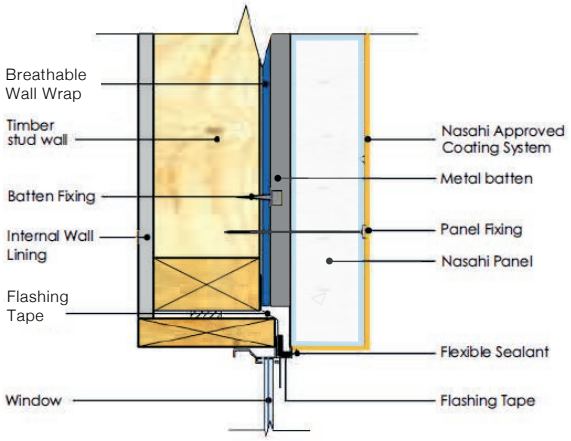
- For N1, N2, N3, C1 the panel is:
  Fixed through verticals battens into framing at
  * 450mm vertical spacing when the panel is supported at the base
  * 300mm vertical spacing when the panel is suspended

  All fixings are 100mm from vertical edge.
  Max. spacing between vertical battens/framing is 400mm.
  Panel is fixed to a minimum of 2 battens.
  Minimum panel width is 300mm.

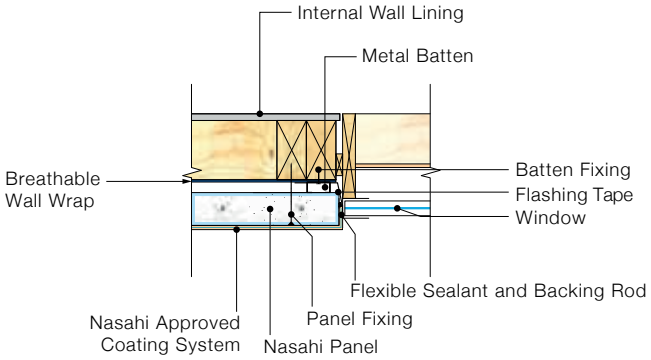
- For N4, N5, C2, C3 the panel is:
  Fixed through verticals battens into framing at
  * 450mm vertical spacing when the panel is either supported at the base or suspended.

  All fixings are 100mm from vertical edge.
  Max. spacing between vertical battens/framing is 200mm.
  Panel is fixed to a minimum of 2 battens.
  Minimum panel width is 300mm.

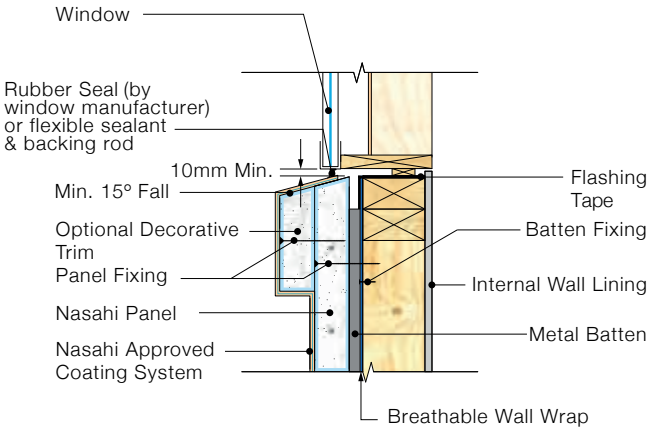
DETAILED DRAWINGS



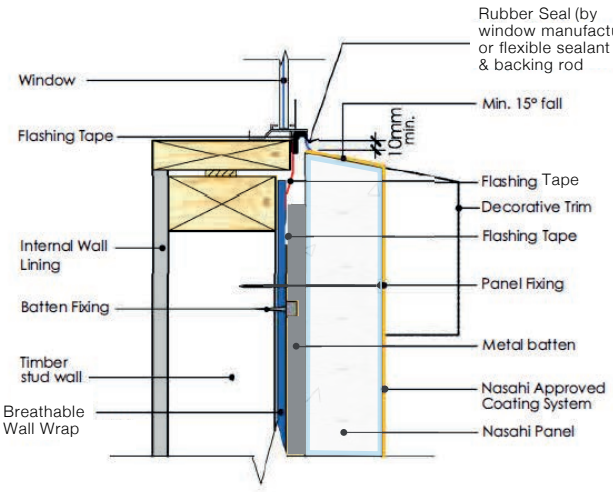
DETAIL 3.1 - Window Head



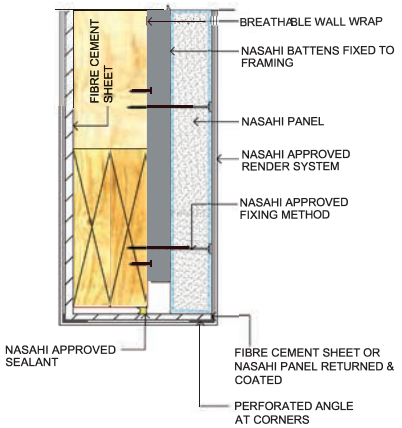
DETAIL 3.2 - Window Jamb



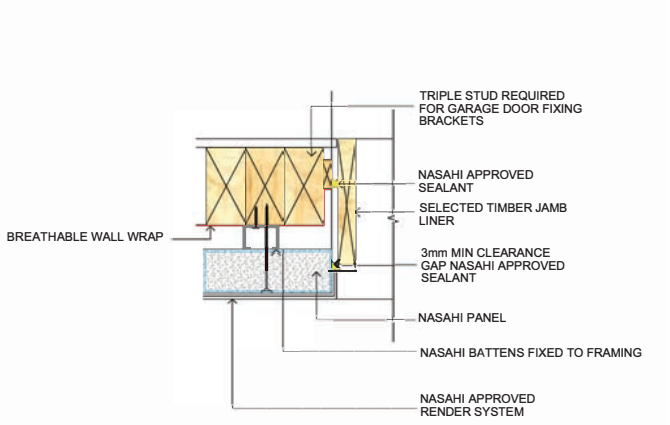
DETAIL 3.3 - Window Sill (Decorative Trim)



DETAIL 3.4 - Window Sill

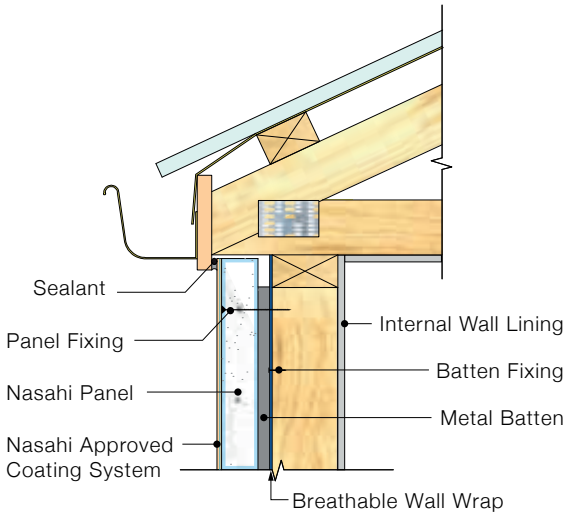


DETAIL 3.5 - Garage Head Detail

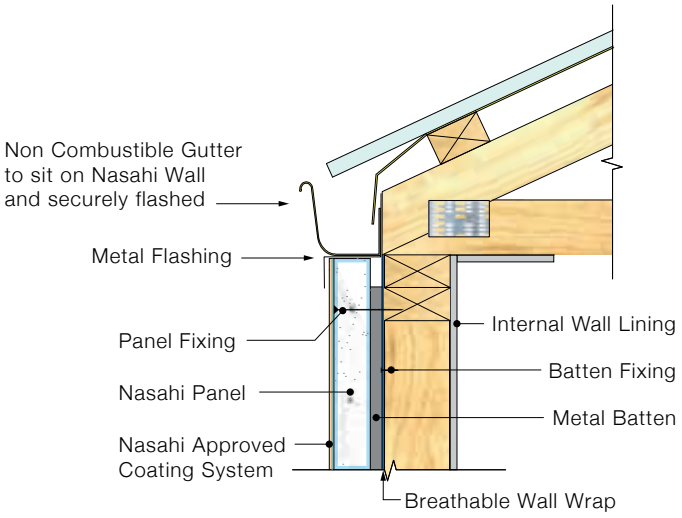


DETAIL 3.6 - Garage Door Jamb Detail

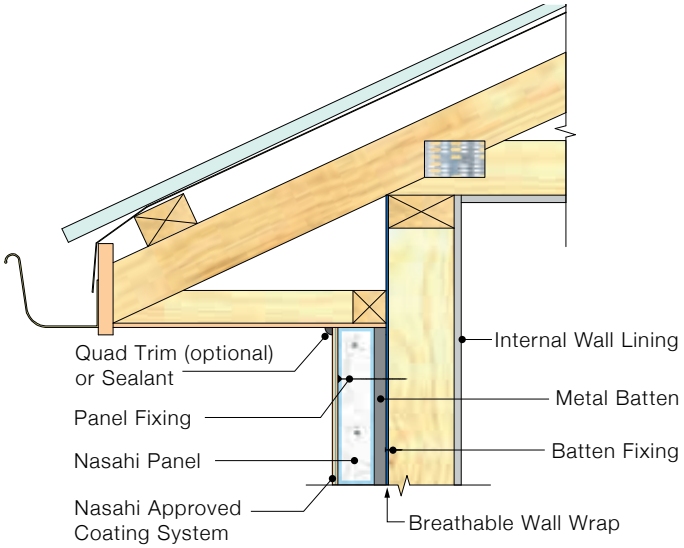
DETAILED DRAWINGS



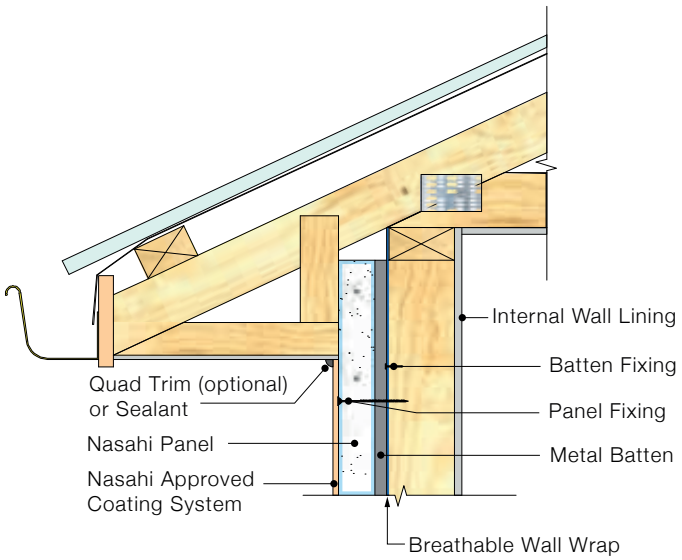
DETAIL 4.1 - Flush Eave



Detail 4.1A - Gutter on Boundary Wall



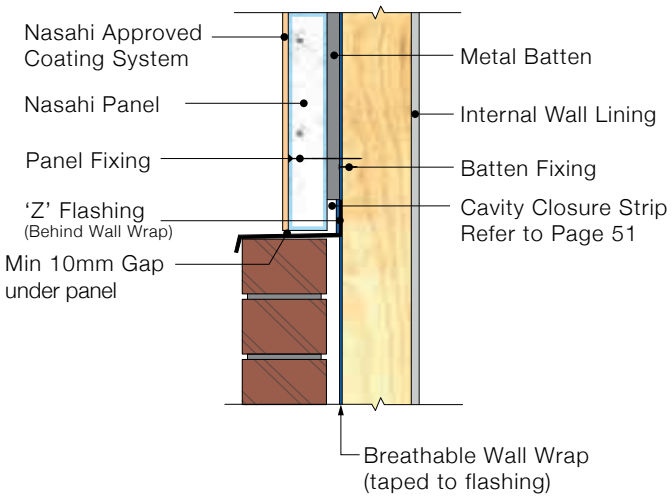
DETAIL 4.2 - Eave Detail (Panel Under)



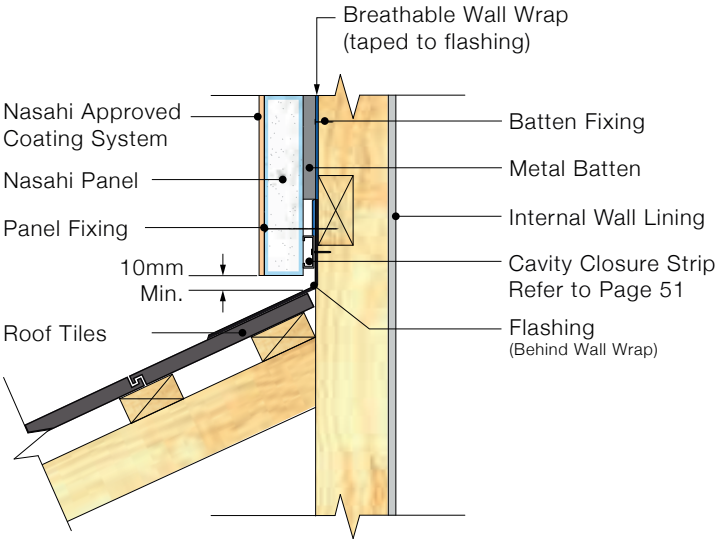
DETAIL 4.3 - Eave Detail (Panel Flush With Lining)

Note: Breathable wall wrap must be sealed adequately to the frame above the finished line of the panel or to the top plate.

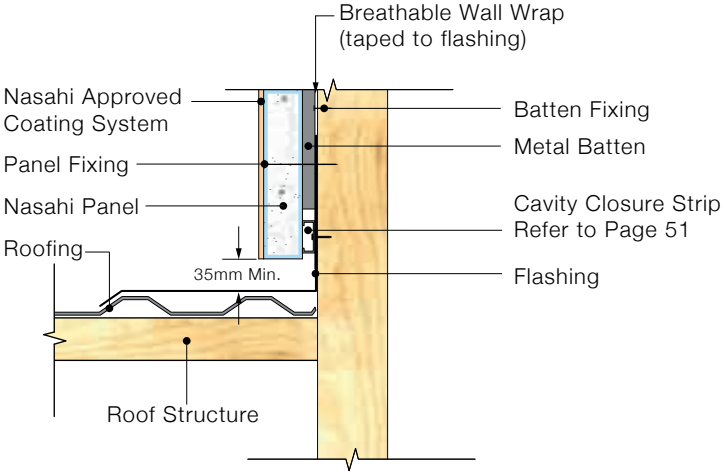
DETAILED DRAWINGS



DETAIL 5.1 - Cladding to Brick Detail

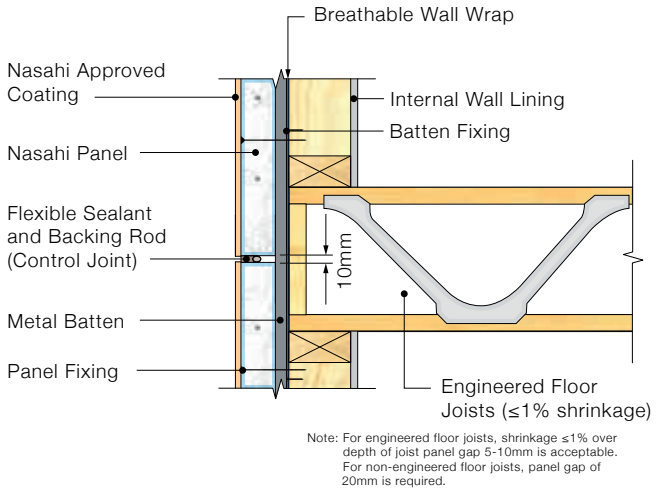


DETAIL 5.2 - Panel to Angle Roof Detail (up to 25°)



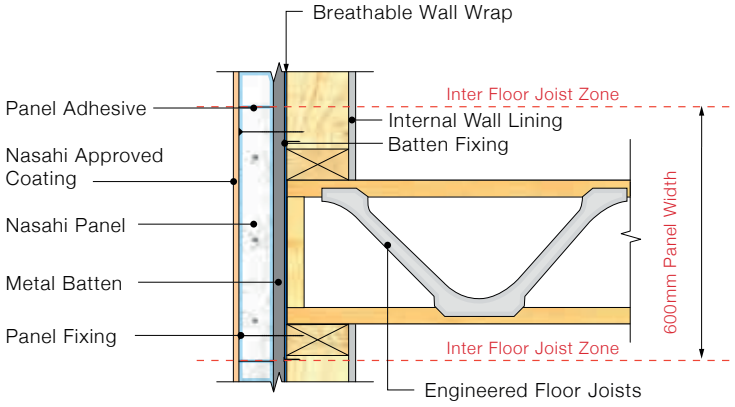
DETAIL 5.3 - Panel to Flat Roof Detail

DETAILED DRAWINGS



Note: For engineered floor joists, shrinkage ≤1% over depth of joist panel gap 5-10mm is acceptable. For non-engineered floor joists, panel gap of 20mm is required.

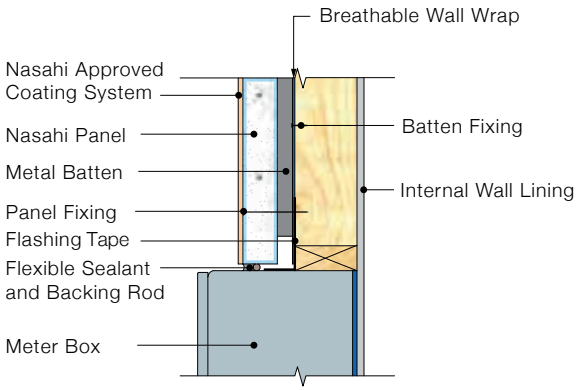
DETAIL 6.1 - Inter Floor Junction (Panel Joint in Joist Zone



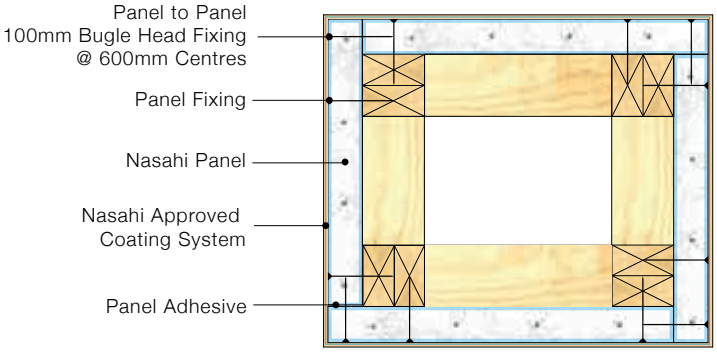
Note: To avoid control joint the joist must close within 600mm panel with Inter Floor Joist Zone

DETAIL 6.2 - Inter Floor Junction (No Panel Joint in Joist Zone)

Note: Engineered Joists are to have Steel web as shown

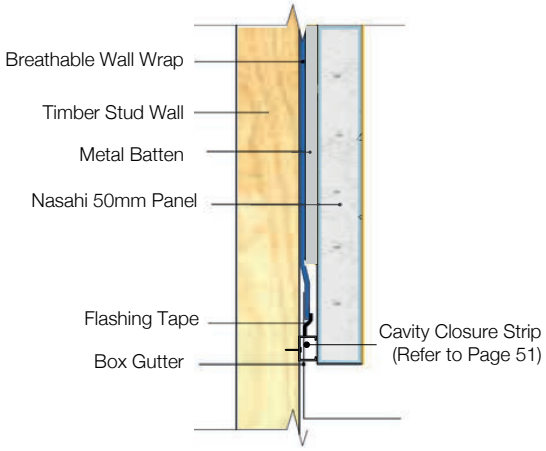


DETAIL 7.1 - Meter Box Installation



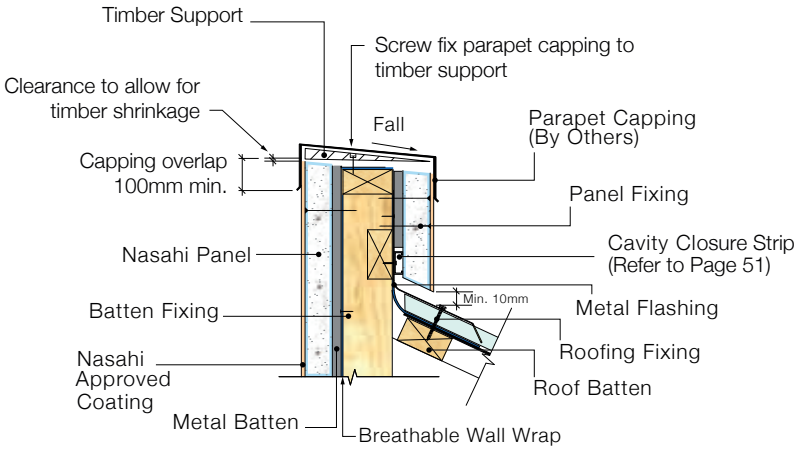
DETAIL 8.1 - Column Detail

DETAILED DRAWINGS

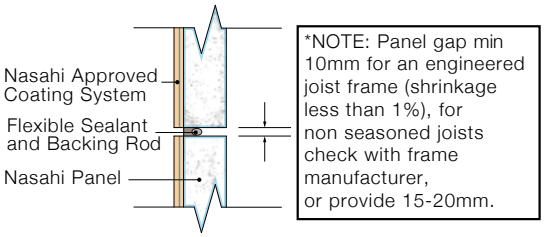


DETAIL 9.0 - Typical Wall Wrap -
To flashing Detail Including Flashing Tape

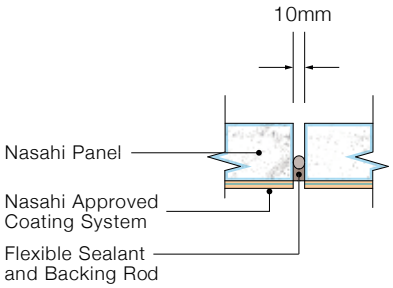
As detailed in Report No. 2015-102-S
by Ian Bennie and Associates



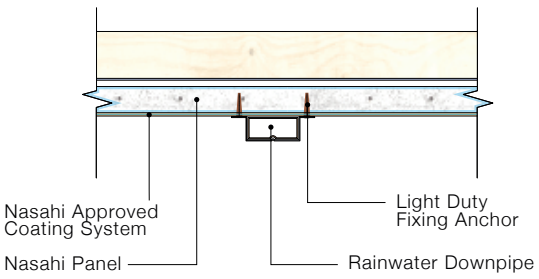
DETAIL 9.1 - Parapet Detail



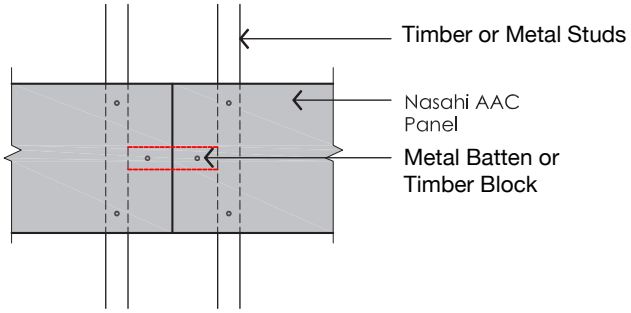
DETAIL 10.1 - Control Joint (Horizontal)



DETAIL 10.2 - Control Joint (Vertical)



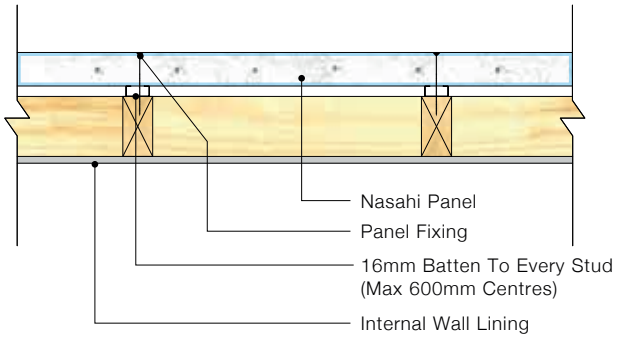
DETAIL 11.1 - External Fixings to Wall



DETAIL 11.2 - Back Blocking for Missaligned Panel

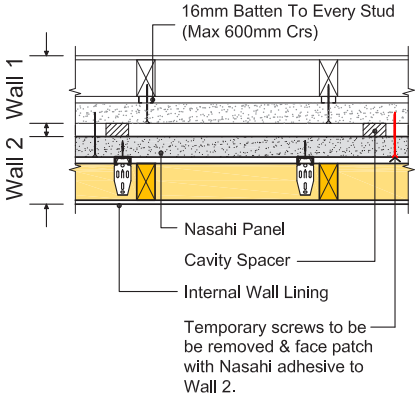
(Only for aesthetic purposes, so panels are aligned & flush)

BOUNDARY WALL DETAILS



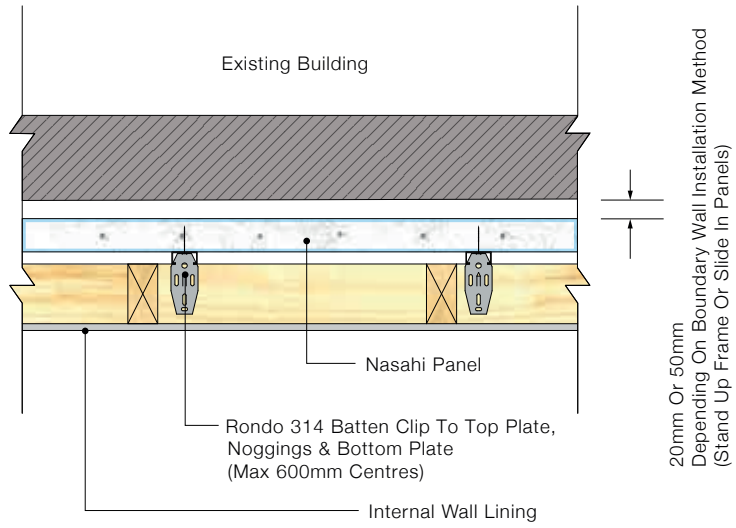
To Be Used Where External Access To Wall Is Available

DETAIL 12.1 - Standard External Wall Detail



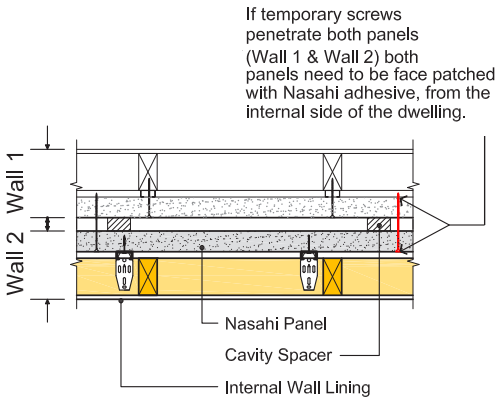
Face Patching Temporary Screw Holes

DETAIL 12.3 - Boundary Wall Fixing Detail C



To Be Used Where External Access To Wall Is Not Available

DETAIL 12.2 - Boundary Wall Fixing Detail B



Face Patching Temporary Screw Holes

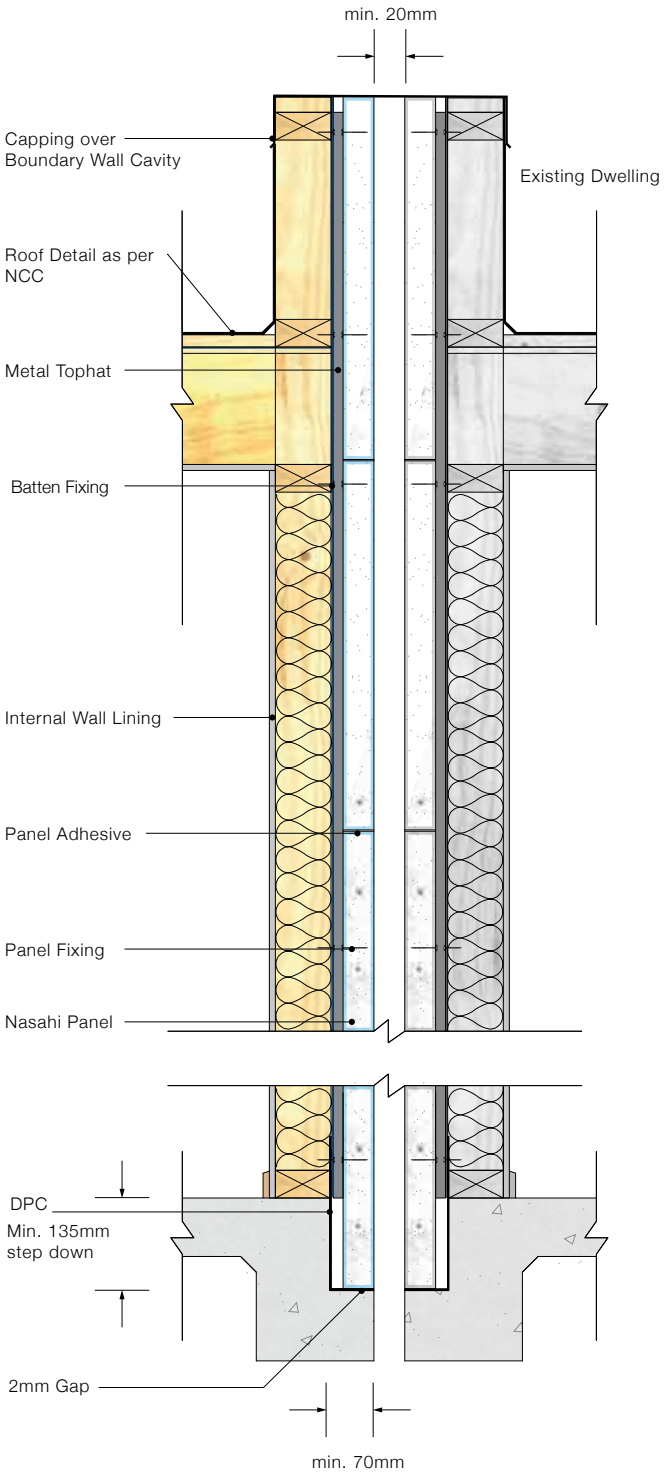
DETAIL 12.4 - Boundary Wall Fixing Detail D

Note:

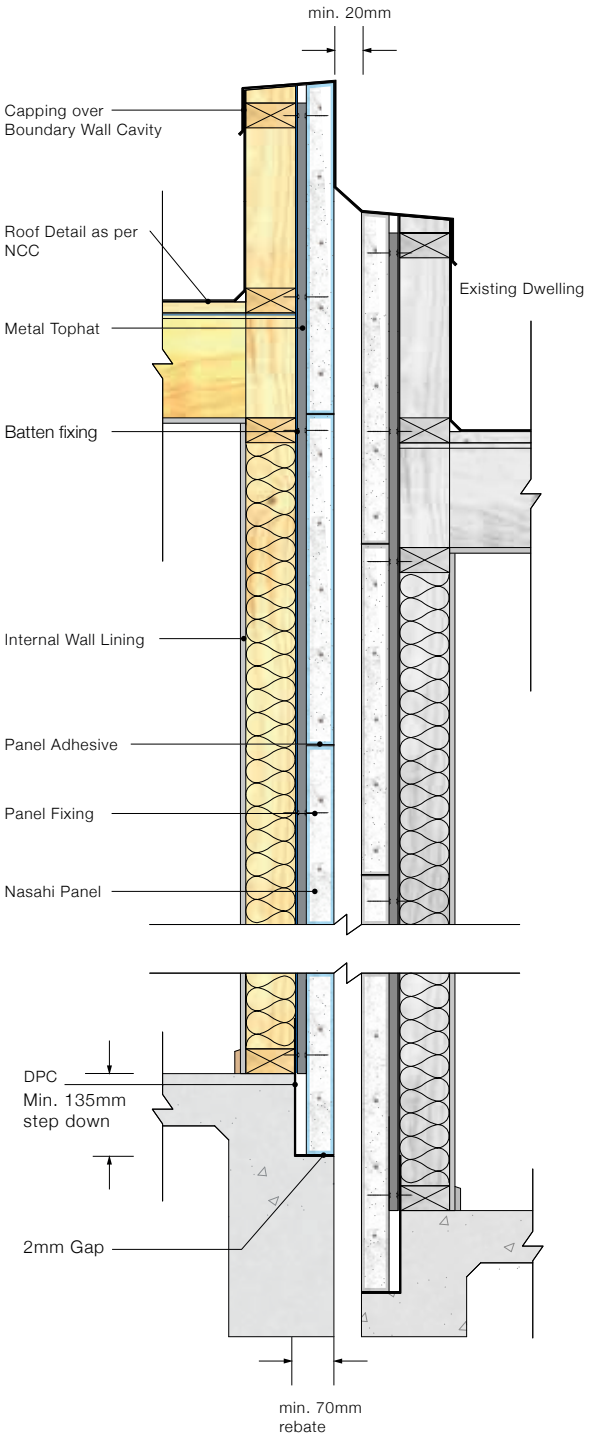
A: Boundary Walls without wrap are only acceptable where there is an existing wall on the boundary, where there are no penetrations, provided the wall is made weatherproof at the top and sides, and a drained cavity is present between adjoining boundary walls, and where there is a min.135mm slab rebate (step-down).

B: Temporary cavity spacers must be removed unless it is an EPS batten. The foam PVC or Polystyrene batten size must be maximum 30mm wide x 20mm-50mm deep.

BOUNDARY WALL DETAILS



DETAIL 13.1 - Boundary Wall Detail (Even Slab)



DETAIL 13.2 - Boundary Wall Detail (Uneven Slab)

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 on 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 and 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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