ABODO

Vulcan Screening
Design Guide

Carefully Crafted Timber

Abodo Vulcan Screening

Timber screening, otherwise known as battens, fins, blades or louvres, is becoming increasingly popular as a way to soften facades, while providing shade from the sun.

Abodo's Vulcan Screening is a high performance natural exterior timber engineered from thermally modified New Zealand plantation timber and then laminated to achieve a unique vertical grain. This enhances stability and durability of the timber and allows excellent spanning capabilities, allowing design possibilities previously unseen with many traditional timber species.

A key advantage of Vulcan Screening is the ability to create section sizes that are larger and more reliable than other solid timbers.

Designed to weather beautifully with time, Vulcan Screening is available in a wide range of profile sizes suitable for batten, rainscreen and louvre type applications. Vulcan timber does not leach tannins, is lightweight, easy to work with, and can be ordered pre-coated.

The fixing of timber screening is almost always custom designed around the building it will be used on. This document has been created as guide to designing with Abodo Vulcan Screening. The information can be used to establish span and connection criteria and inform engineering design.

Design Scope

This Design Guide covers above ground exterior applications of vertical and horizontal decorative screening elements such as battens, rainscreens, facade fins/blades, pergola rafters and battens to eaves/soffits.

Refer to Abodo 'Technical Data Sheet – Vulcan Screening' for additional information.

For verandah rafters, beams and posts with a roof over, refer to Abodo 'Vulcan GL8 Span Tables – Australia'.

This Guide is intended for use in Australia and New Zealand.

Species

New Zealand radiata pine.

Treatment

Thermally modified to 230 degrees schedule then, for Australia only, LOSP to H3 (AS1604).

Glue Lamination/Finger-Jointing

Purbond HBS polyurethane adhesive - VOC, solvent and formaldehyde free.

Exterior Type 1 – AS/NZS4364. Approved for Service Class 3 (exterior structural applications).

Third party certified to AS/NZS1328.1 and AS/NZS1491.1.

Structural Grade

GL8

Characteristic Strengths (MPa)					Elastic Moduli (GPa)	
GI grade rigidity	Bending (MOR)	Tension parallel to grain	Shear in beam	Compression parallel to grain	Short modules of elasticity parallel to end grain (MOE)	Short duration modulus for beams
8	20.50	9.60	3.7	38.50	10.40	-

*20% reduction in strength/stiffness assumed when wet.

Characteristic Lateral Load Strength for Fastening	
	Joint Group
Nail:	JD4
Screw:	JD5

Durability

Class 2 (above ground) (AS5604), Class 1 (EN350-1).
For New Zealand building code compliance: Suitable for uses described in NZS3602:2003 Table 2A 'Requirements for wood-based building to achieve a 15-year durability performance – Members exposed to exterior weather conditions and dampness'.
Expected minimum service life – 30 years.
Thermally modified pine is resistant to most wood boring insects but is not always resistant to termites. Preservative treatment LOSP H3 (AS1604) is available for termite zones with 25 year limited warranty (subject to terms and conditions).

Average Timber Density

420kg/m3.
To calculate the weight of any batten size (kg/lineal metre) use average density of 420 kg/m3 x width (m) x thickness (m) e.g. 25x42mm batten: 420 x 0.025 x 0.042 = 0.44 kg/m.

Material Compatibility

Indicative pH: 3.9.
Vulcan has little or no corrosiveness with most metals and can be placed in contact with most building materials (however separation is required from zinc). If timber is LOSP treated care must be taken to separate from solvent sensitive building materials. Normal PVA, PU, MUF glues, RF resins and standard sealants can be used.

Expected dimensional change in structure

Width expansion approx 2%, length expansion approx 0.25%, thickness expansion approx 2.5%.
(From 7%MC to fibre saturation -variation will occur between boards).

Length Availability

Standard lengths 4.2m, 4.8m, 5.4m, 6.0m
Other length options may be available including finger jointed, subject to availability and/or minimum order quantities.
Please check availability with our local Distributors.
Refer to Abodo 'Technical Data Sheet - Vulcan Screening' for additional information.

Cardrona Cabin: Vulcan Screening 65x25mm in Sioo:x Finish.

Fire

Vulcan timber is classified Group 3 (AS/NZS3837) and is generally considered a combustible material.

Fire retardant coatings to provide Group 1 compliance may be available in some regions (please contact our local distributors).

Appropriate design such as off-setting screening elements to prevent spread of fire or providing fire breaks can often account for local build code requirements, provided the screening is not part of the cladding system. Consultation with a fire engineer is recommended prior to specification. For Bushfire BAL design requirements contact Abodo.

End Grain Protection

Timber end grains are significantly more susceptible to water ingress than faces/edges. Therefore all ends must be protected with Abodo's Protector – End Seal, equivalent wax sealer, paint, Sioo:x End Grain Sealer (where Sioo:x is the applied coating), or metal end caps.

If Protector – End Seal, wax sealer or paint is used, then a 15 degree fall must be applied to tops of vertical screening to shed water.

Metal end caps should be considered for tops of vertical screening in heavily exposed situations as this provides the most durable long-term protection. Do not use metal end caps at the bottom of vertical screening or where they can catch water.

Minimum Distance from Base of Screening

- 100mm (preferred) to paved ground.
- 175mm to unpaved ground.
- 35mm to base of bracket or deck .
- 5mm to flashings with a minimum 15 degree fall.

Screening systems must be designed to allow timber to dry out in service and avoid water entrapment at end grain.

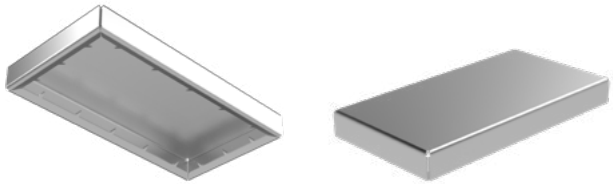
End-to-End Joining

End joins should be avoided where possible.

If joins are required, these can be made by a minimum 35 degree mitre join allowing minimum 5mm gap between the ends to allow good drainage and ventilation.

Alternatively boards may be joined together over cavity batten/ substructure with a 35 degree mitre and adhesive sealant such as Sikaflex 11FC in the join, ensuring complete coverage of sealant to both end grains and with fixings placed either side of the join.

For tops of vertical battens, allow minimum 15 degree angle cut for quick surface drainage. At bottom of verticals consider a 15 degree angle cut for a drip point at the face of the batten. In all cases, the end grain must be thoroughly sealed with Abodo Protector – End Seal, or equivalent.



Abodo Metal End Cap.

Grain Orientation

Where possible, the timber should be oriented during installation to expose the vertical grain face of the timber to the weather. This is especially true for square section sizes such as 42x42.

Vertical grain oriented towards the weather

Weather-exposed face | Weather-exposed face

Note: The above is an overview only. Installers should refer to specific design information on the construction specification for more detail.

Surface Finish

For exterior applications, it is recommended that a band sawn textured finish be applied for better penetration and performance of the coating. Less preferred surface finishes are brushed or smooth dressed that has been sanded with 80 grit. Smooth dressed timber is not recommended for exterior applications.

Vulcan Screening is supplied as standard with a band sawn finish all sides resulting in an attractive matt finish.

Coating

Vulcan will take most: stains, penetrating oils, paints, polyurethanes, and varnishes, although uptake of coating can be higher than other more dense species such as hardwoods.

For exterior applications penetrating coatings such as Abodo Protector Water Borne, Sioo:x or an approved equivalent are recommended. Screening must be coated on all sides including the back and ends, with at least two coats to faces and edges exposed to the weather.

For timber roof rainscreens, access for maintenance can be a challenge. For this reason we normally recommend the Sioo:x coating system for low maintenance and to let the timber silver off evenly.

For interior applications other specialist coatings are recommended. Please contact Abodo or a Distributor for advice.

Typical Fixing Details

The stability of Vulcan, along with its GL8 structural grading, allows excellent spanning in many cases without mid fixing points.

Maximum allowable spans will depend on the timber size, the design wind speed for the site and whether it's a single span or continuous multiple spans.

Mid-point tie rods may be used to provide lateral restraint to the timber section and to act as a fixing point to increase spans.

Below is a range of typical screening applications along with fixing techniques.

Note: These are not intended as specific design details, rather to show typical configurations and general guidance.

Cladding Substrate

Where screening is fixed over cladding, the cladding system must be designed and installed to be weathertight in accordance with local building code requirements.

Care must be taken to ensure any penetrations through cladding e.g. fixing points are made weathertight with the use of sealant and exterior durable EPDM washers.

Timber framing must be designed to relevant local building regulations with studs and noggs/ dwangs positioned to allow structural fixing of the screen substructure.

High performing cladding systems generally include cavity battens that should be designed to allow for good drainage and ventilation behind the cladding.

Flashings must be used as appropriate to deflect and drain water away to the outside of the wall.

Substructure, Rails and Rainscreen Cavity Battens

Screening battens are generally attached to a substructure frame, structural rails or rainscreen cavity battens. These substructure elements must be designed to meet short and long term structural and durability requirements of the site and local building codes.

Aluminium, steel or timber may be used for substructure elements, as appropriate to the end use application.

Timber must be minimum Class 3B (H3.2) preservative treated pine or minimum Class 2 natural durability and grade, making it suitable to act as structural element in exterior applications.

The substructure may be used to pre-fabricate panels with the battens set out and then face fixed or rear fixed with screws to the substructure. The panels can then be positioned and fixed to the substrate.

The design of the substructure is not within the scope of this design guide and should be designed at the discretion of the builder/designer.

Fasteners, Cleats and Brackets

Stainless-steel screw fasteners are recommended for visible/exposed applications e.g. face fixing.

Hot dipped galvanised fasteners may be used for non-visible applications e.g. secret or side/ rear fixing.

Where battens or fins are spaced further apart or are of a larger size, individual fix to the substrate using cleats will be preferred over a substructure rail.

Hot dipped galvanised, aluminium or stainless-steel cleats/rails may be used.

316 stainless steel must be used in all cases in sea spray zones.

When designing fixing points for screening, especially battens/ fins, allowance must be made for adequate restraint of timber to reduce movement/ twisting in service.

Balustrades

Vulcan timber is not suitable for use as a primary safety barrier in exterior situations. In this case the primary safety barrier must form part of the substructure made from a suitably durable material such as aluminium, steel or preservative treated timber. Vulcan may be used as decorative in-fill.

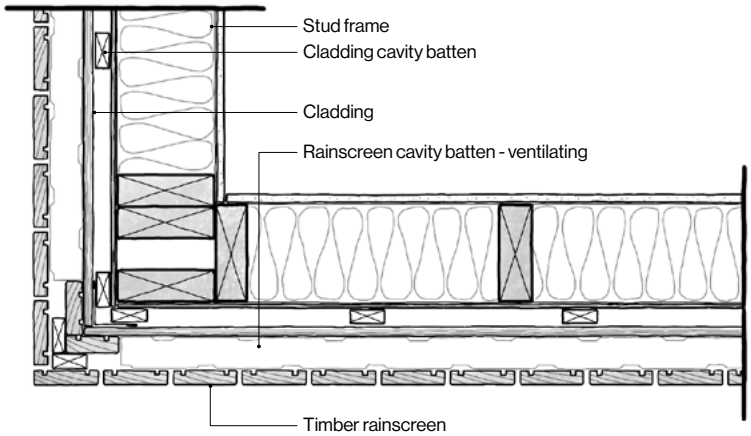
Rainscreens

Open joint rainscreen systems typically utilise 18mm or 25mm thickness screening fixed with a 5-10mm gap between board edges.

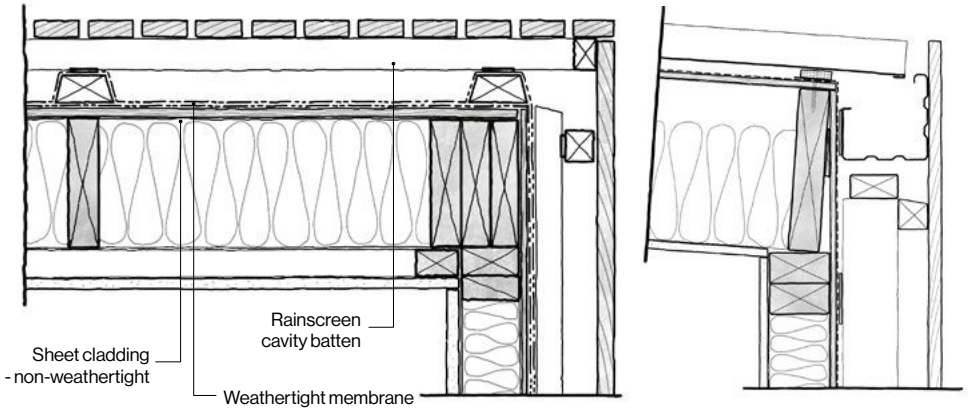
The screening is face fixed or rear fixed onto structural timber cavity battens, that are in turn structurally fixed through a cladding or weathertight membrane system, to the framing structure behind. This allows water and air to flow freely around the timber and cavity behind it. For rear fixing use 25mm thick screening battens.

Careful attention to detailing should ensure the integrity of the weathertight substrate as well as good drainage and ventilation in the cavity behind the timber screen battens. Refer to the following details for general guidance however they are not intended as a fully designed proprietary system.

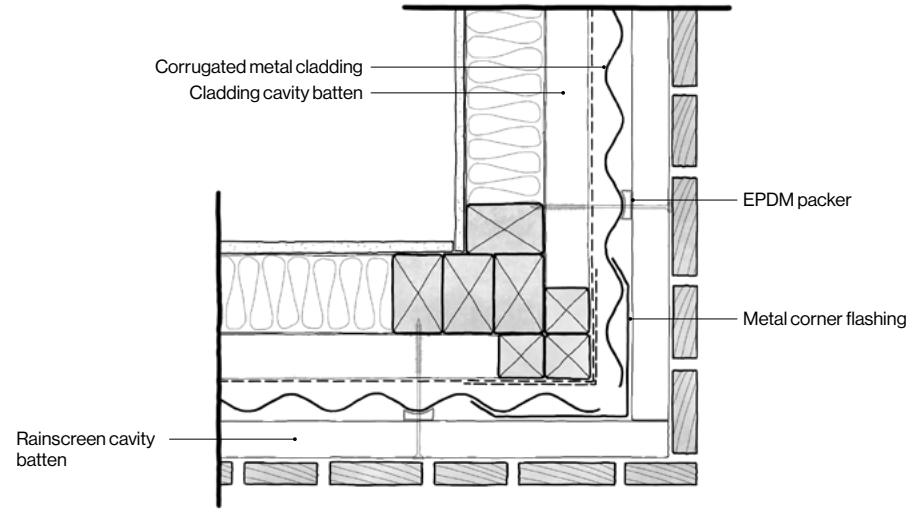
Rainscreen Fixing Ideas – Walls:



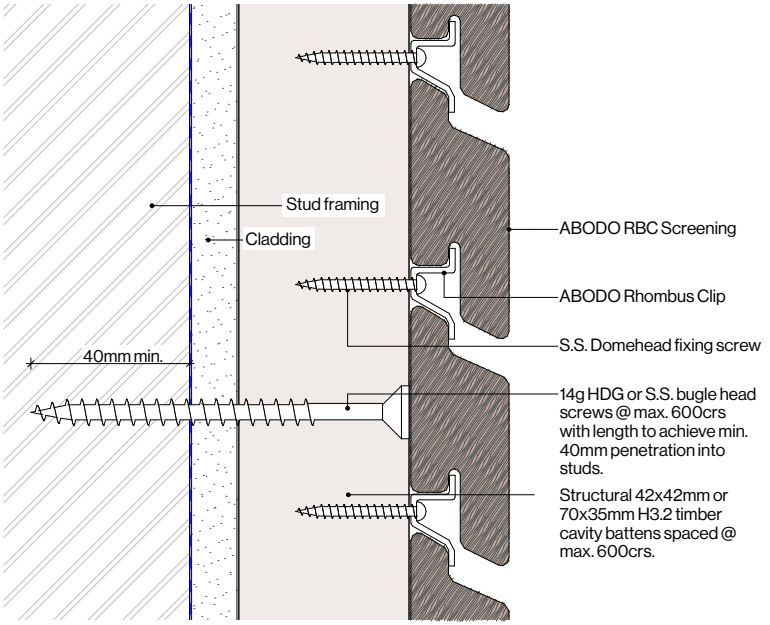
Sheet cladding such as plywood or fibre cement on cladding cavity batten with rainscreen cavity battens over top. Normally the cladding has a paint finish.



Membrane system.

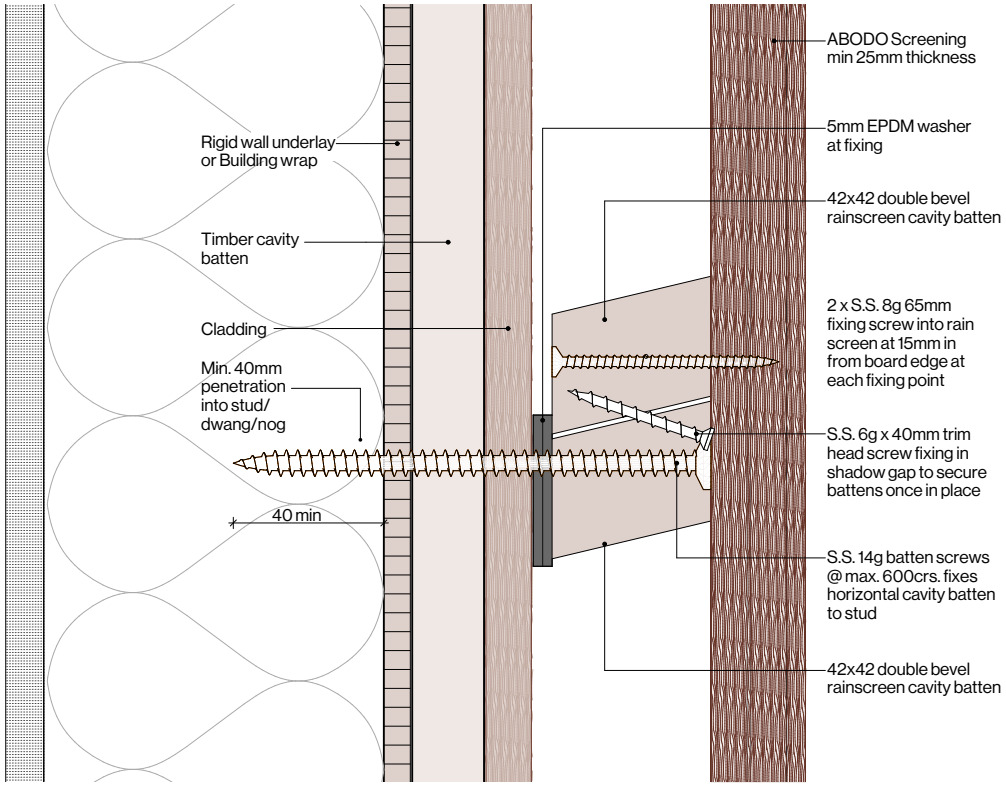


Metal cladding – corrugate or similar.



Abodo Rhombus Clip rain screen system. Refer Abodo Technical Data Sheet - Rhombus Clip Screening.

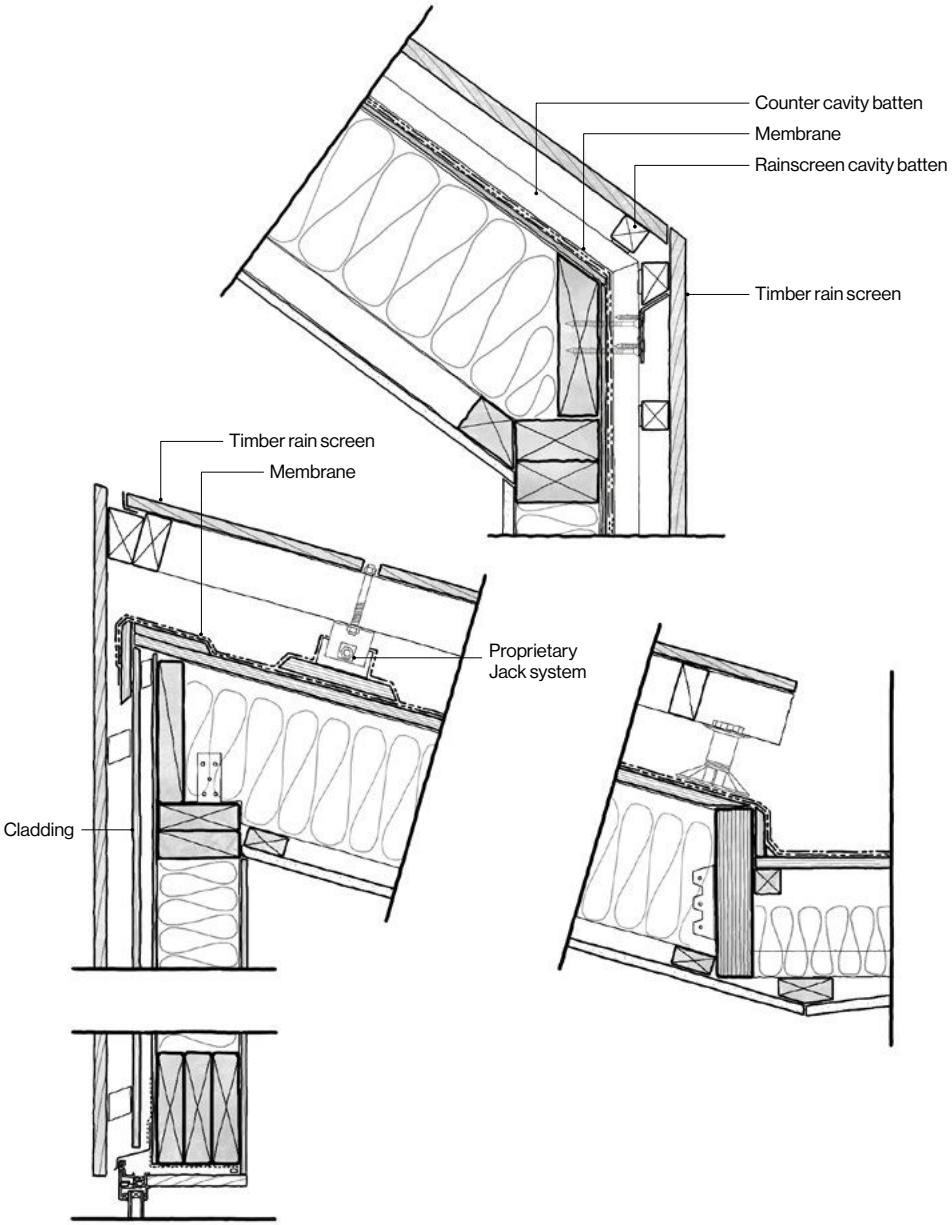
Rainscreen Fixing Ideas – Walls:



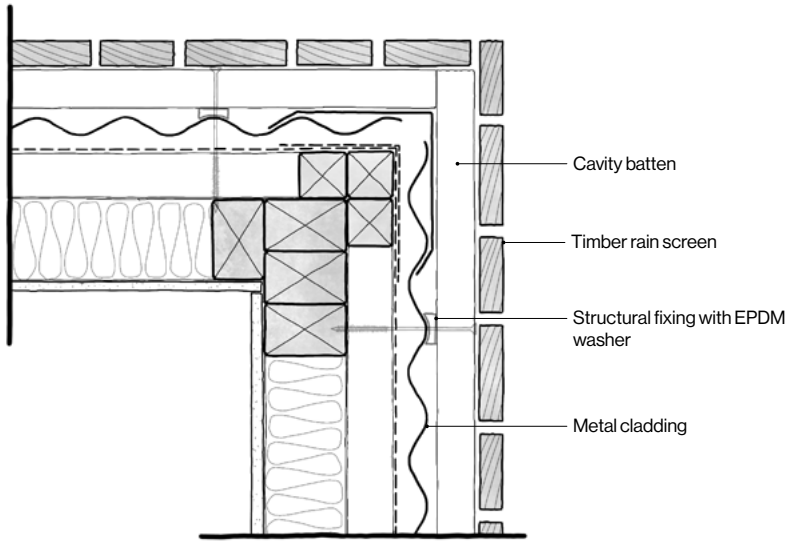
Abodo rain screen panelised cavity batten fix. Contact Abodo for further information.

The Grounds: Vulcan Screening in Sioo:x Finish.

Rainscreen Fixing Ideas – Roofs:



Membrane system with cavity battens or a jack system.



Metal roofing with cavity battens.

General Tips for Roof Rainscreen Construction

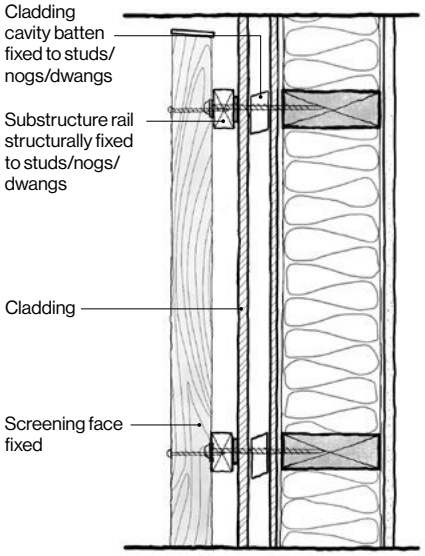
If transitioning from timber roof to timber wall, a membrane system will normally be required over the whole building. In this scenario placement of gutter at base of wall may be considered as this removes the need for concealed or internal guttering.

Designers should contact the preferred cladding/membrane/roofing supplier for more detailed specification advice.

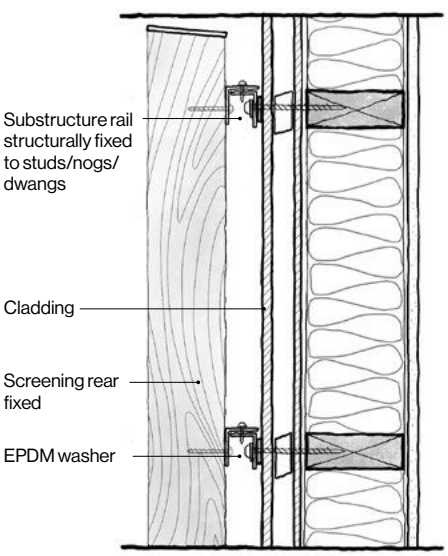
The system must be designed to allow for future access to the substrate cladding for maintenance purposes. This can be achieved by face fixing the screening with screws, or designing a system of prefabricated panels that can be removed by unscrewing at fixing points. In this scenario 25mm thickness screening may be rear fixed through the back of the cavity batten so no visible fixings are shown.

Fins/Battens – Vertical

The most common fixing detail for vertical fins is a bracket or rail at top and bottom with fixing points to these.

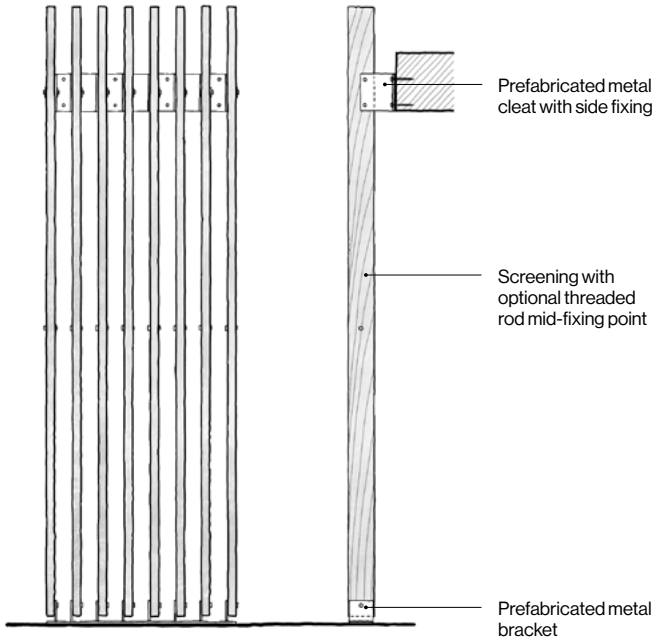


Batten depth 42mm or less – face fixed or rear fixed

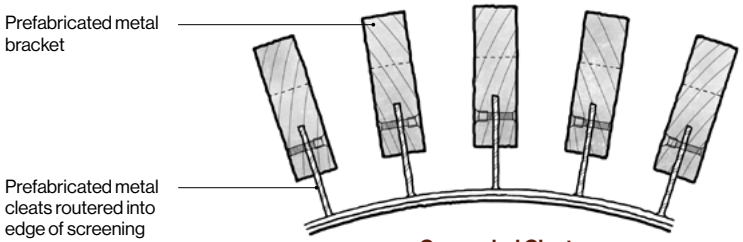


Batten depth 42mm or greater – rear fixed

Screw fixing.

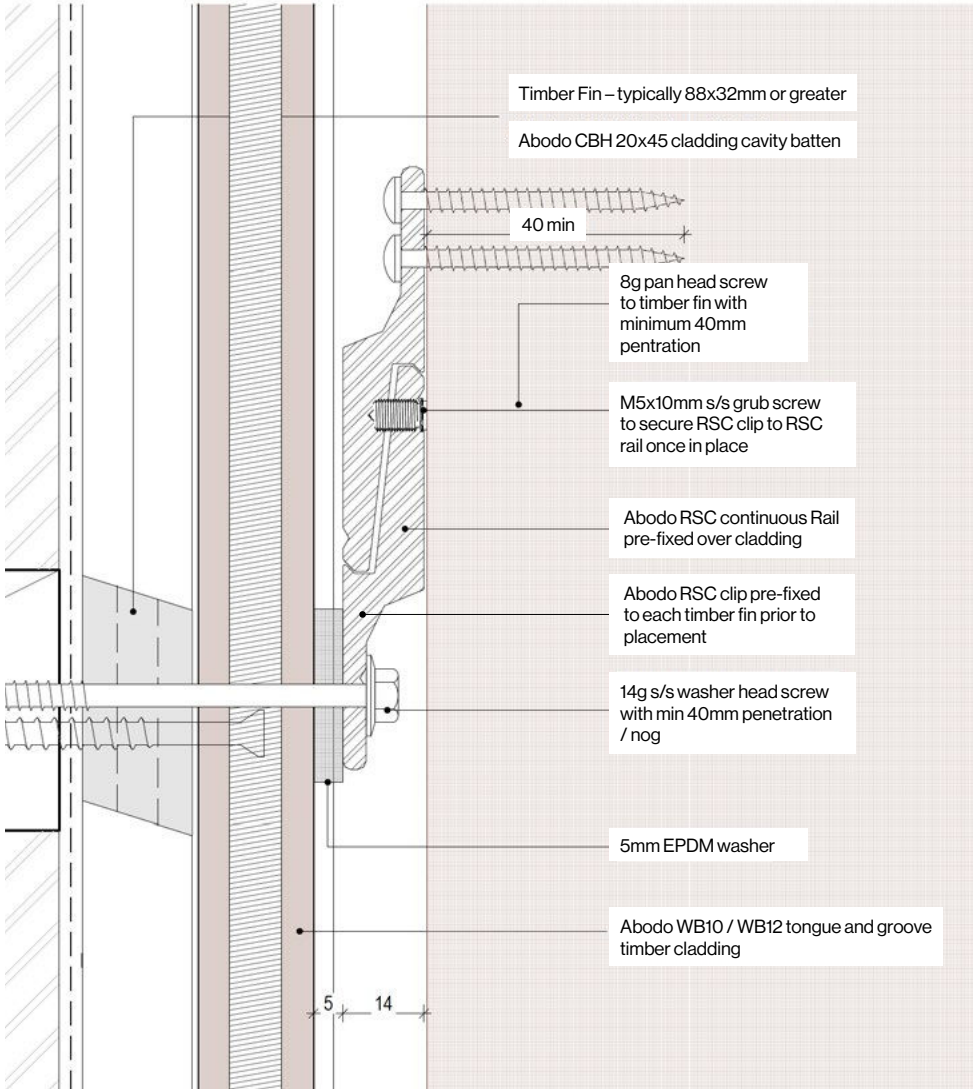


Side or Concealed Cleat – Batten typically 88x42mm or greater



Concealed Cleat

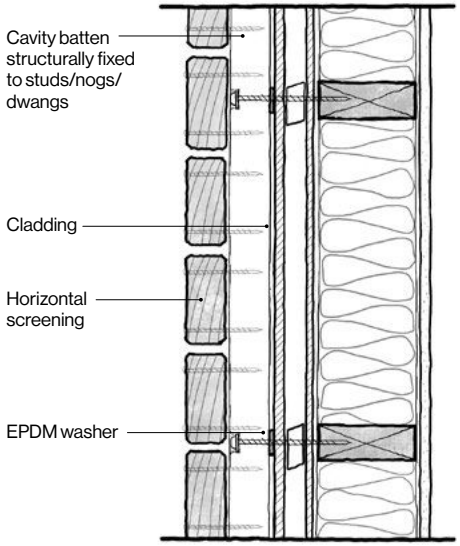
Cleat/bracket fixing – 32mm or greater timber thickness.



Abodo RSC batten clip system. Contact Abodo for further information.

Fins/Battens – Horizontal

Horizontal battens are typically face fixed into a vertical cavity batten with two fasteners per fixing point.



Rail cavity batten.

Te Ara a Tawhaki: Vulcan Screening 88x42mm in Sioo:x Finish.

Wind Speed – Regions and Zones Guidance

It is important to categorize and design each structure on a case-by-case basis. Each site should be assessed individually for its wind classification. Each building must be assessed for compliance with geometry and for evaluation of pressures before designing screening structures.

New Zealand

NZS 3604 Timber framed buildings requires that buildings are designed to withstand the winds that they are likely to be subjected to. Bracing requirements must be calculated separately for both wind and earthquake loadings; the bracing must be designed for the greater of the two loads. The amount of bracing required to resist the lateral wind loads on the building under NZS 3604 is based on the design wind speed.

NZS 3604 divides New Zealand into two wind regions (A and W) and several lee zone areas – these are areas where the landforms create localised wind acceleration resulting in higher wind speeds than the rest of the region.

It also classifies wind zones into categories, set out in the following table, according to maximum ultimate limit state speeds.

Wind Zone Classifications (from NZS 3604 Timber Framed Buildings)

Classification	Maximum Ultimate Limit State Speed
Low	Below 32 m/s
Medium	37 m/s
High	44 m/s
Very High	50 m/s
Extra High	55 m/s
Specific Design (SD)	Over 55 m/s

Table 5.1 in NZS 3604 provides steps to determine wind zone. From Table 5.1, determination of the wind zone for a particular site requires the following steps:

- Determine the wind region.
- Determine whether in a lee zone.
- Determine ground roughness.
- Determine site exposure.
- Determine topographic class.

In practice, there are several different ways to establish the wind zone for a specific site. They are, with the most precise method at the top:

- Calculations made specifically for a site following AS/NZS 1170.2:2011 Structural design actions – Part 2: Wind actions
- Calculations made specifically for a site following NZS 3604:2011 Timber-framed buildings
- Council wind maps (if based on AS/NZS 1170.2:2011 or NZS 3604:2011)
- BRANZ Maps. BRANZ Maps is an experimental tool that can assist in determining a wind zone – it is not yet sufficiently precise to give a definitive wind zone for a specific site.

Specific Design

The wind zones defined in NZS 3604 are based on a number of simplifying assumptions, such as wind direction, general topography and shelter. In some situations, the wind zone classifications may under- or over-estimate the site wind speed. In such cases, employing an engineer to assess the site conditions may be a more cost-effective design option. It will be required where the wind speed is over 55 m/sec.

The information above is taken from the BRANZ website.

Australia

To determine the wind classification for your domestic building site you must consider four factors: the Region, the Terrain Category, a Shielding Factor, and the Topography.

This information is to be used as an approximate guide for residential structures only. This information is based on the Australian Standard AS4055-2012, wind load for housing. For a detailed analysis refer to the Australian Standard AS/NZS1170.2:2011. This approach is only suitable for houses up to 2 storeys high and no wider than 16m and 8.5m high.

The wind classification relates to gust wind speeds (m/s) that affecting a given site. The determination of a wind classification is critical in ensuring that a building is designed and constructed to the level appropriate to withstand the wind forces it will be subjected to. The wind classifications defined in the standards are summarised in the Table 1 following:

Table 1 – Wind Classification Conversion Table

Wind Classification		
Regions A and B	**Regions C and D**	**Gust Wind Speed (m/s)**
N1 [Non - Cyclonic]	N/A	W28
N2 [Non - Cyclonic]	N/A	W33
N3 [Non - Cyclonic]	C1 [Cyclonic]	W41
N4 [Non - Cyclonic]	C2 [Cyclonic]	W50
N5 [Non - Cyclonic]	C3 [Cyclonic]	W60
N6 [Non - Cyclonic]	C4 [Cyclonic]	W70

Seismic

In seismic zones, consideration for movement in the event earthquake must be factored into the structure according to local building regulations.

Engineer Producer Statement Letter

PRODUCER STATEMENT
DESIGN CERTIFICATE

TASMAN CONSULTING ENGINEERS
CIVIL & STRUCTURAL

ABODO WOOD – SCREENING BOARDS

Tasman Consulting Engineers Limited has been engaged by Abodo Wood Limited to provide design services for the development of span tables for screening boards.

The design has been carried out using sound and widely accepted engineering principle with loads derived from AS/NZS1170:2002 *and structural design to* AS1720.1:2010.1 Timber Structures - Design methods.

I, David J King, being a Chartered Professional Engineer and currently holding an Annual Practising Certificate, believe on reasonable grounds that the design will meet the requirements of the Building Code of New Zealand and the Building Code of Australia.

David King

David King
ME (civil), CMEngNZ
CPEng (NZ) no 145511, IntPE(NZ)

For Tasman Consulting Engineers Limited
PO Box 3631, Richmond, NELSON 7050
NEW ZEALAND

January 2021

Westmere House: Vulcan Screening and Cladding 88x42mm in Nero Protector Oil Finish.

Span Tables – Vertical Spans

- Tables are based on 'wet' use assuming ~20% reduction in dry strength.
- GL8 timber grade.
- Design to AS1720:2010.1 Timber Structures.
- Spans shown are for single span.
- Two or more spans, increase maximum single span by 10% (assuming approx. equal spans).
- Maximum cantilever 1/4 maximum span length but no more than 1/2 actual span.
- Double spans may be created with a tie rod as a mid-span fixing point.
- Board orientation any direction i.e. short or long dimension to face.
- Required minimum fixing capacity at each end based on worst case of short and long term and for both pull-out and shear resistance.
- Intermediate fixings are to have twice the capacity required at each end of a single span, as shown below each table.

Note: Stated section sizes are not all available ex-stock and may require custom manufacture with lead time and minimum order quantity. Please check availability prior to specification/order.

Table 2	**Design Wind Speed (m/s)**				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
18 x 42	490	490	490	490	490
18 x 65	755	755	755	755	755
18 x 88	935	935	935	935	935
18 x 138	1170	1170	1170	1150	1080
18 x 180	1335	1335	1260	1150	1080

Required fixing capacity at each fixing point: 0.50kN

Table 3	**Design Wind Speed (m/s)**				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
25 x 42	945	945	945	945	945
25 x 65	1315	1315	1315	1315	1315
25 x 88	1530	1530	1530	1530	1500
25 x 138	1915	1760	1685	1575	1500
25 x 180	1955	1760	1685	1575	1500

Required fixing capacity at each fixing point: 0.51kN

Table 4	**Design Wind Speed (m/s)**				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
32 x 32	1180	1180	1180	1180	1180
32 x 42	1530	1530	1530	1530	1530
32 x 65	1905	1905	1905	1895	1805
32 x 88	2140	2120	2025	1895	1805
32 x 138	2350	2120	2025	1895	1805
32 x 180	2350	2120	2025	1895	1805

Required fixing capacity at each fixing point: 0.65kN

Table 5	**Design Wind Speed (m/s)**				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
42 x 42	1850	1850	1850	1850	1850
42 x 65	2540	2540	2485	2325	2215
42 x 88	2810	2600	2485	2325	2215
42 x 138	2885	2600	2485	2325	2215
42 x 180	2885	2600	2485	2325	2215

Required fixing capacity at each fixing point: 0.75kN

Table 6	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
65 x 65	3930	3605	3450	3225	3075
65 x 88	4000	3605	3450	3225	3075
65 x 138	4000	3605	3450	3225	3075
65 x 180	4000	3605	3450	3225	3075
65 x 238	4000	3605	3450	3225	3075

Required fixing capacity at each fixing point: 1.25kN

Table 7	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
88 x 88	5020	4525	4330	4050	3860
88 x 138	5020	4525	4330	4050	3860
88 x 180	5020	4525	4330	4050	3860
88 x 238	5020	4525	4330	4050	3860

Required fixing capacity at each fixing point: 2.10kN

Span Tables – Horizontal Spans

- Tables are based on 'wet' use assuming ~20% reduction in dry strength.
- GL8 timber grade.
- Design to AS1720:2010.1 Timber Structures.
- Assuming boards oriented with wider side vertical.
- Spans shown are for single span.
- Assuming two fixing points per batten.
- Long term deflection under self-weight limited to 2mm or span/600.
- Maximum cantilever 1/4 maximum span length but no more than 1/2 actual span.
- Two or more spans, increase maximum single span by 10% (assuming approx. equal spans).
- Required minimum fixing capacity at each end based on worst case of short and long term and for both pull-out and shear resistance.
- Intermediate fixings are to have twice the capacity required at each end of a single span, as shown below each table

Note: Stated section sizes are not all available ex-stock and may require custom manufacture with lead time and minimum order quantity. Please check availability prior to specification/order.

Table 8	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
18 x 42	490	490	490	490	490
18 x 65	755	755	755	755	755
18 x 88	935	935	935	935	935
18 x 138	1170	1170	1170	1150	1080
18 x 180	1335	1335	1260	1150	1080

Required fixing capacity at each fixing point: 0.50kN

Table 9	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
25 x 42	945	945	945	945	945
25 x 65	1315	1315	1315	1315	1315
25 x 88	1530	1530	1530	1530	1500
25 x 138	1915	1760	1685	1575	1500
25 x 180	1955	1760	1685	1575	1500

Required fixing capacity at each fixing point: 0.51kN

Table 10	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
32 x 32	1180	1180	1180	1180	1180
32 x 42	1530	1530	1530	1530	1530
32 x 65	1905	1905	1905	1895	1805
32 x 88	2140	2120	2025	1895	1805
32 x 138	2350	2120	2025	1895	1805
32 x 180	2350	2120	2025	1895	1805

Required fixing capacity at each fixing point: 0.61kN

Table 11	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
42 x 65	1940	1940	1940	1940	1940
42 x 88	2260	2260	2260	2260	2215
42 x 138	2830	2600	2485	2325	2215
42 x 180	2885	2600	2485	2325	2215
42 x 238	2885	2600	2485	2325	2215

Required fixing capacity at each fixing point: 0.99kN

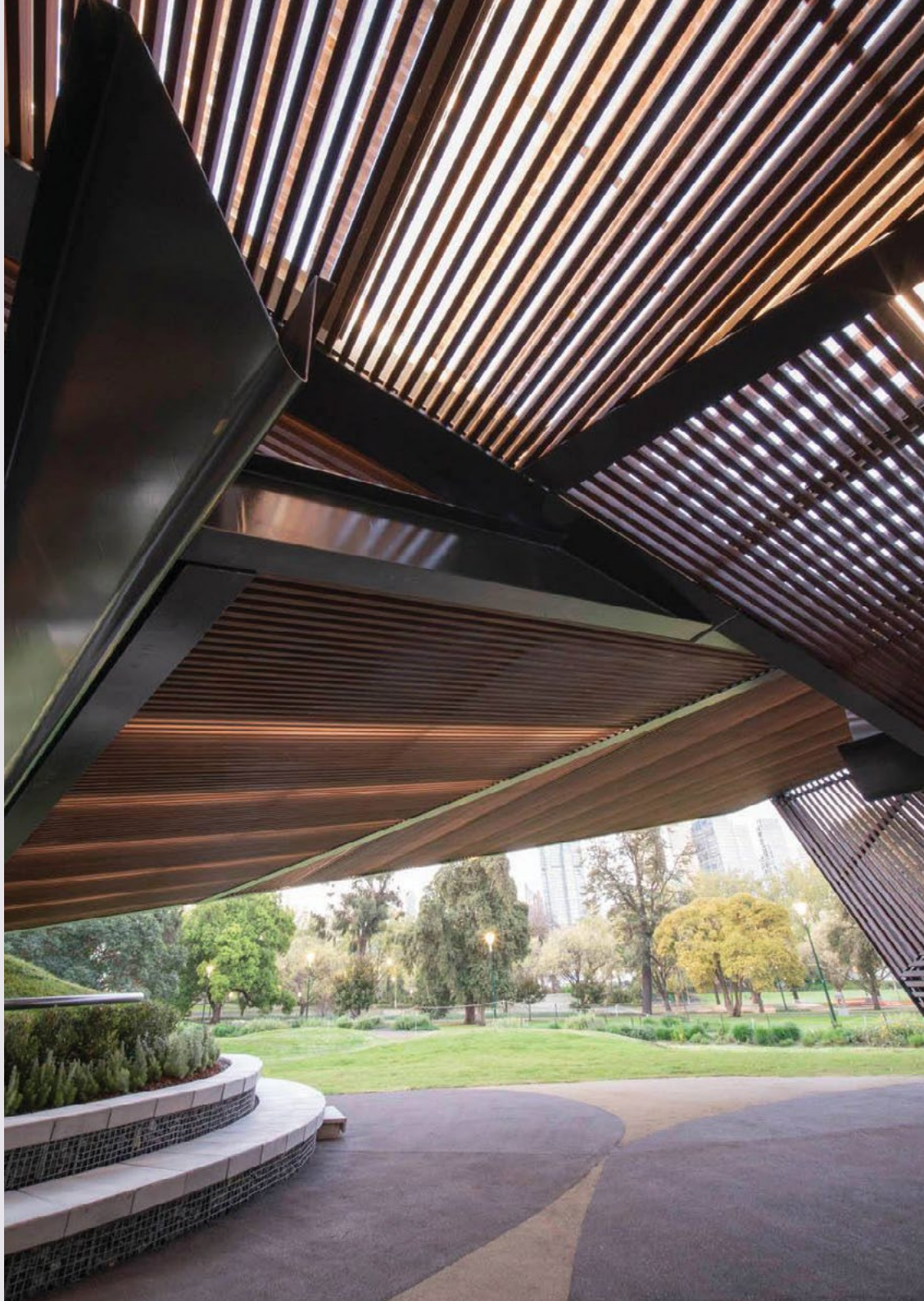
Table 12	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
65 x 65	1940	1940	1940	1940	1940
65 x 88	2260	2260	2260	2260	2260
65 x 138	2830	2830	2830	2830	2830
65 x 180	3230	3230	3230	3225	3075
65 x 238	3715	3605	3450	3225	3075

Required fixing capacity at each fixing point: 1.38kN

Table 13	Design Wind Speed (m/s)				
	32	37	44	50	55
Board size (mm)	**Recommended maximum spans (mm)**				
88 x 88	2260	2260	2260	2260	2260
88 x 138	2830	2830	2830	2830	2830
88 x 180	3230	3230	3230	3230	3230
88 x 238	3715	3715	3715	3715	3715

Required fixing capacity at each fixing point: 2.13kN

Mpavilion: Vulcan Screening finished in Resene Woodsman.



Abodo New Zealand (Head Office)
E info@abodo.co.nz
W abodo.co.nz

Abodo Australia
E info@abodo.com.au
W abodo.com.au