

Ecohousing Building Systems

Design Recommendations

WALL PANEL SYSTEM

The wall panels are of a sandwich construction comprising a rigid Polyurethane injected foam core with inner and outer facings of 6mm or 4.5mm fibre cement sheeting. The vertical edges of the panels have a moulded recess that accepts a SHS steel locator key running full length between adjacent panels. For cyclone and high wind rated areas, the panels also have steel reinforcing channels embedded into the foam core during manufacture.

Dimensions

Ecohousing Wall Panels come in various size configurations as standard. Other sizes may be available upon special request.

Dimensions - Wall Panels		
Dimension	Standard Values	Tolerance
Width	900mm	+/- 5mm
Length (Height)	2400, 3000 & 3600mm	+/- 5mm
Thickness	78 & 103mm	+/- 3mm
Core Density (PUR)	48kg/m ³	+/- 5kg/m ³

Fixing Method

Panels are located within a steel bottom plate and are keyed into adjacent panels using a steel SHS which also encapsulates a threaded steel tie rod that passes through the bottom track to be anchored to the foundation.

Adjacent panels are bonded along the vertical faces using a high performance construction adhesive. A steel channel top plate is then fitted and tied down to the foundation using the steel tie rods. If required, the top and bottom plates can then be screwed to the panel facings for higher bracing strength.

Design Loads

The wall panel system has been tested by James Cook University's Cyclone Testing Station. The test reports have been analysed by certified engineers to identify and present the following design recommendations.

Axial Loads – Wall Panels

Panel Dimensions	Maximum Vertical Compressive Load	Ultimate Design Load
2400x900x78mm <i>(Standard)</i>	98 kN	67 kN
2400x900x78mm <i>(Reinforced)</i>	120 kN	82 kN
2400x900x103mm <i>(Reinforced)</i>	240 kN	164 kN

Racking (Bracing) Loads – Wall Panels

Panel Dimensions	Maximum Racking Load	Ultimate Design Load
2400x900x78mm <i>(Standard)</i>	16.1 kN/m	5.4 kN/m
2400x900x78mm <i>(screw braced)</i>	21 kN/m	7.1 kN/m

ROOF PANEL SYSTEM

The roof panels are of a sandwich construction comprising a rigid Polyurethane injected foam core with an inner and outer face of 0.42mm roll formed steel Smartspan profile (similar to Spandeck) in Zinalume or Colorbond finish.

Dimensions

Ecohousing Roof Panels have a standard cover width of 700mm and length can be specified when ordering. Panels come in Right Handed or Left Handed configuration which describes the location of the male joining edge, which determines the laying direction of the panels.

Dimensions - Roof Panels		
Dimension	Standard Values	Tolerance
Width (Cover)	700mm	+/- 5mm
Length	2000 - 9000mm	+/- 5mm
Thickness	103mm (At ridge)	+/- 3mm
Core Density (PUR)	48kg/m ³	+/- 5kg/m ³

Fixing Method

Roof Panels are joined together along the adjacent edges by way of the incorporated clip locking system. The female edge of one panel has a hollowed recess to allow the male edge of the adjacent panel to be overlapped on each face creating a full length mechanical joint between the panels.

The panels are then pan-fixed in every pan at each end and along the length of parallel walls with 14g x 115mm 'Stormfixx' screws to an appropriately selected steel or timber support.

Design Loads

The roof panel system has been tested by James Cook University's Cyclone Testing Station. The test reports have been analysed by certified engineers to identify and present the following design recommendations.

Design Loads - Roof Panels

Span	Ultimate Design Load
3600mm	5.54 kPa
6000mm	1.99 kPa

The ultimate design moment derived from testing results is $M_u = 8.91 \text{ kNm}$.

COMBINED ROOF & WALL PANEL SYSTEM

When combined together as a structure, the wall and roof panel systems are certified to meet wind and fatigue load test requirements in accordance with AS 1170.2 (1989). The certification was based on the following test configuration:

- 2700x900x78mm wall panel (reinforced)
- 3600mm span roof panel
- Refer to design recommendations for further configuration

The roof panel as specified in the above test configuration is also certified to meet the fatigue load requirements specified by Building Code of Australia Appendix for NT.

The above items have been designed for an applied ultimate maximum wind load based on:

- Region C
- Terrain category = 2
- Ultimate wind speed (V_u) = 70m/s
- Maximum eave height = 6.0m
- Shielding multiplier = 1.0
- Topographic multiplier = 1.0
- External wall pressure coefficient = -0.65
- External roof pressure coefficient = -0.9
- Internal pressure coefficient = 0.7
- Local pressure coefficient = 1.5
- Roof ultimate limit state design pressure = 5.54 kPa
- Wall ultimate limit state design pressure = 4.5 kPa