

## Plywood Installation

### Installation

#### FRAMING

- Use timber or steel frame spacings in Table 4 to suit Ecoply thickness.
- Ensure top edges of framing are properly aligned.
- Use kiln dry Laserframe, hyBEAM or hySPAN framing to lower moisture level in roof spaces and reduce differential truss or rafter deflections.
- Blocking (nogs, dwangs)
  - block all edges of standard “square edge” Ecoply Structural plywood.
  - block all Ecoply edges at the ridge and gutter lines to prevent sag at capping or gutters. -block for high face loads or under areas accessed for maintenance.
  - blocking within the body of the roof is not required for tongue and grooved edges, unless plywood is being used as a diaphragm to resist horizontal wind or earthquake

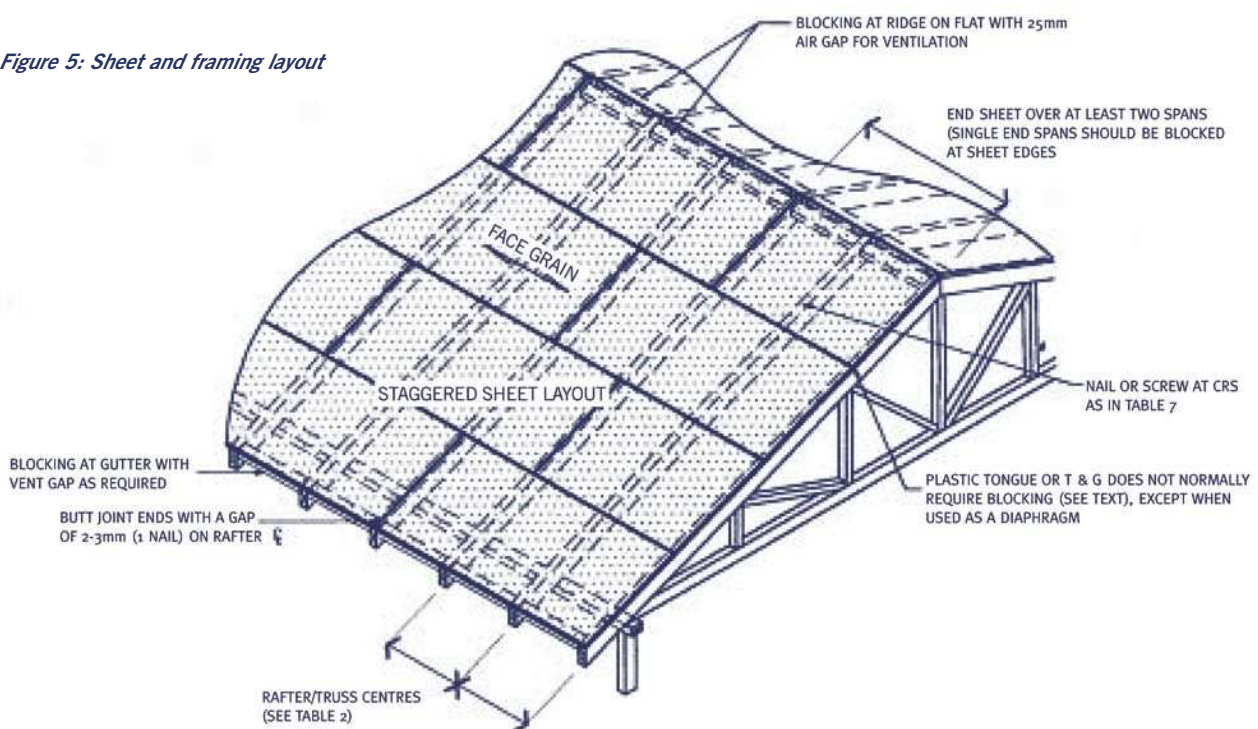
loads, with fixings to transfer shear across the joints. In this case, details should be specified on drawings.

- use blocking “on the flat” to provide gaps where air flow is needed for ventilation.

#### SHEET LAYOUT

- Ensure Ecoply sheets are dry before installation.
- Place face grain at right angles to supports.
- Sheets must be continuous over at least two spans (three framing members).
- Lay the sheets in a staggered pattern.
- With square edge sheets, allow a 2 to 3 mm expansion gap between sheets.
- Butt tongue and groove panels at the tongues because the machined edges can accommodate the movement. Allow a 2 to 3 mm expansion gap at the ends.
- Allow 5mm clearance inside confining structure such as

Figure 5: Sheet and framing layout



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Table 5: Recommended minimum bending radii for Ecoply plywood

ECOPLY THICKNESS (mm)	7	9	12	15	17	19	21	25
Along sheet (m)	1.8	2.3	3.6	4.6	5.9	6.7	7.4	8.6
Across sheet (m)	0.6	1.0	2.2	2.9	4.2	4.6	5.2	6.5

concrete or brick walls adjacent to the roof.

- Allow clearance for ventilation as required.

### FIXING OF SHEETS

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roofing. The minimum fastener specifications are in Tables 6 and 7. For high wind zones (over 44 m/s), very exposed sites, cyclonic conditions or roofs above 8 metres average height, carry out specific structural design to the relevant national standards.

- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping.
- Do not over-drive gun nails or screws.
- Fix at least 7 mm or 3 fastener diameters from the sheet edges or behind tongues.
- Fix no more than 15 mm from sheet edges.
- Space fasteners at centres according to wind exposure in Table 7.
- Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture during construction and service. Galvanised fasteners are the minimum recommendation and are normally satisfactory in dry wood. Where Ecoply or framing may become damp or is H3 treated, use stainless steel screws or annular grooved nails for maximum durability. Follow the recommendations of the fastener manufacturer or Skellerup CertainTeed styles.

### FIXING TO TIMBER:

- Galvanised nails or annular grooved nails have better holding power than smooth nails.
- Use flathead nails. Do not use jolt or bullet head nails.
- Ring shank nails or annular grooved nails or screws are recommended for additional holding power.
- Stainless steel nails must be annular grooved.
- Ensure fastener is compatible with the roofing cover (see Design and Detailing on Page 6, and consult roofing suppliers).
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50 mm long staple with 12 mm crown and legs 1.8 mm diameter. Space staples 20% closer than nails (Table 7). Refer manufacturer for corrosion resistance and durability.

### FIXING TO STEEL:

- Fix directly to roll formed steel (up to 2 mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may break. Keep Ecoply dry or use larger screws or:
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length.

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Figure 6: End joint

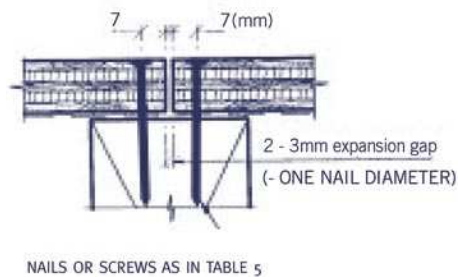
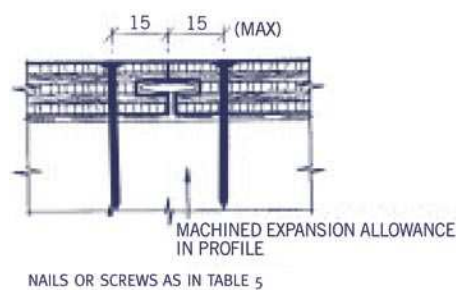


Figure 7: Tongue joint edge fixed onto each frame crossing



### ADHESIVES:

Polyurethane adhesives may be used for non-permanent loads and reduced fastener popping.

- Use a bead of structural polyurethane adhesive in accordance with manufacturer's instructions.
- Apply pressure using the standard fastener patterns above.
- Polyurethane adhesives must meet American Plywood Association (APA) specification AFG 01 (e.g. BRANZ appraised Holdfast Gorilla Nail Power or similar).

For full structural bonds with permanent loads use factory applied phenolic glue to NZS 3606:1987 "Specification for the Manufacture of Glue Laminated Lumber", or similar.

### FIXING OF ROOFING

Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate. Some shingle systems may not be used in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

### References and Sources of Information

- CHH Woodproducts "Ecopy Structural Manual"
- CHH Woodproducts "Durability Statement", 01/11/10
- CHH Woodproducts "Plywood, Fire and the Building Code", 95/03/14
- BRANZ Bulletin 345: Flat membrane roofs - design and installation
- BRANZ Bulletin 346: Flat membrane roofs - materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 141A, 307, 334, 404, 406, 411, 412

### Standards

AS 1684:1999 "Residential Timber Framed Construction" AS/NZS 2269:1994 "Plywood – Structural" NZS 3602:1995 "Timber and Wood-based Products for Use in Building" NZS 3603:1993 "Timber Structures Standard" NZS 3604:1999 "Timber Framed Buildings" NZS 3606:1987 "Specification for the Manufacture of Glue Laminated Lumber" NZS 4203:1992 "General Structural Design and Design Loadings for Buildings"

### Supply

Available from stockists, merchants and agents throughout New Zealand, Australia, Pacific Islands and some Asian countries.

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**Table 6: Fasteners and characteristic shear loads**

PLYWOOD THICKNESS (mm)	7 & 9	Load	12 & 15	Load	17	Load	19 & 21	Load	25	Load
Minimum nail size in timber	40x2.5mm	570	50x2.8mm	710	60x2.8mm	710	60x2.8mm	710	75x3.15mm	883
Screw size in timber	No. 8x30mm	1230	No.8x40mm	1230	No. 10x40mm	1650	No. 10x45mm	1650	No. 10x50mm	1650
Screw size in 1.15mm steel*	10-24-35	1300	10-24-40	2000	10-16-45	2100	10-16-45	2100	10-16-45	2100
Screw size in 2.80mm steel*	10-24-35	1200	10-16-40	1200	14-20-45	3000	14-20-45	4000	14-20-45	5000

\* Self tapping, self countersinking screw † Screw numbers indicate: Gauge - Threads per inch - Length (mm)

‡ The load is the characteristic load (N) for one fastener in single shear

Note

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested.
- verified by the designer for performance under changing physical conditions and cyclic loading.

**Table 7: Maximum fastener spacing for Ecoply plywood in roofing**

Wind speed category (Refer NZS 4203)	FASTENER SPACING IN ROOF WIND SUCTION ZONE		
	High suction Zone A (above gables)	Zone B (near ridge and eaves)	Standard Zone C (bulk of roof)
Low and medium (up to 37m/s)	100	150	150
High, (up to 44 m/s) increase nail dia. to 3.05mm	100	100	150
Very high or cyclonic use specific design to NZS 3603 and NZS 4203			

**Figure 8: Gable and hip fixing**

