



BRANZ Appraised

Appraisal No. 1017 [2018]

ECOPLY® BARRIER FOR STEEL

Appraisal No. 1017 [2018]

Amended 05 August 2020



BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 Ecoply® Barrier for Steel consists of sealed plywood sheets with graphite infused EPS foam to the back face and a range of associated flashing tapes. Ecoply® Barrier for Steel is designed for use as a rigid wall underlay, air barrier, thermal break and temporary weather-protecting sheathing behind cavity wall cladding systems on steel framed buildings. Ecoply® Barrier for Steel is also for use as a wall bracing system to resist wind and earthquake loads on steel framed buildings.

Scope

- 2.1 Ecoply® Barrier for Steel has been appraised for use as a rigid wall underlay, air barrier, thermal break and temporary weather-protecting sheathing on steel framed buildings within the following scope:
 - the scope limitations of NASH Building Envelope Solutions, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained and vented cavity; and,
 - with masonry veneer claddings to specific design; and,
 - situated in NASH Standard Part Two 2019 Wind Zones up to, and including Extra High.
- 2.2 Ecoply® Barrier for Steel has also been appraised for use as a wall bracing system for steel framed buildings subject to specific design to the NZBC for buildings or parts of buildings within the scope limitations of this Appraisal.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Ecoply® Barrier Steel, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Ecoply® Barrier for Steel meets the requirements for loads arising from earthquake and wind [i.e. B1.3.3 (f) and (h)]. See Paragraphs 8.1 - 8.5.

Clause B2 DURABILITY: Performance B2.3.1(a), not less than 50 years, B2.3.1(b), 15 years and B2.3.2. Ecoply® Barrier for Steel meets these requirements. See Paragraphs 9.1 - 9.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the wall cladding system, Ecoply® Barrier for Steel will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause E3 INTERNAL MOISTURE: Performance E3.3.1. Ecoply Barrier Steel meets the minimum requirements for a thermal break for use with steel framing to prevent condensation and fungal growth. See Paragraphs 13.1 and 13.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Ecoply® Barrier for Steel meets this requirement and will not present a health hazard to people.

Technical Specification

4.1 The components and accessories for Ecoply® Barrier Steel, which are supplied by Carter Holt Harvey Plywood Limited:

- **Ecoply® Barrier for Steel panels** - 7 mm thick, 1197 mm wide and 2440 or 2745 mm long structural plywood, manufactured from radiata pine in accordance with AS/NZS 2269, and H3.2 CCA treated in accordance with AS/NZS 1604.3. The sheets are coated on the front face and four edges with a beige polyester powder coating. The plywood sheets used are identical to those also used in the Ecoply® Barrier system and feature identical branding. A 10 mm thick layer of EPS foam is affixed to the back face of the plywood with staples during manufacture. Ecoply® Barrier for Steel is identified by the presence of the EPS layer to the back face.
- **Ecoply® Sealing Tape** - 60 mm x 30 m, tape for panel joints
- **Ecoply® Frame Sealing Tape** - 150 mm x 30 m
- **Ecoply® Sill Tape** - 150 mm x 20 m.

Tapes are branded Ecoply® and marked with the tape type for identification.

4.2 The components and accessories for Ecoply® Barrier for Steel, which are supplied by the building contractor are:

- **Ecoply® Barrier for Steel Horizontal Jointer** - PVC horizontal 'Z' flashing supplied by E2 Redway Flashings [Redway Code RDZF17].
- **Screw fasteners** - screws meeting the following specifications:
 - 10-16-35 Screw.
 - 10 g x 35 mm (minimum screw size/length); and
 - thread count of 16 TPI (threads per inch); and
 - pitch: 60°.

Screws shall be hot dipped galvanised in Climate Zones B and C, and a minimum of Grade 304 stainless steel in Climate Zone D.

- **Bracing panel end stud connection** - FRAMECAD® HDF - A1 Anchor bracket and washer. The Anchor bracket is fabricated from Grade G350, 1.6 mm BMT, Z275 Galvanised steel and is approximately 125 mm high, 50 mm long and 50 mm wide. The washer is fabricated from Grade G250, 6.0 mm BMT, Z275 Galvanised steel and is approximately 50 x 50 mm. Both the Anchor bracket and washer are finished with a factory applied proprietary green protective coating. The FRAMECAD® HDF - A1 Anchor bracket must be connected to the stud with 8 Hex Head 12 g screws.

- 4.3 Bottom plate to floor frame or slab - masonry anchor connection to concrete slab, bolt or screw connection to a steel floor joist, screw connection to a timber floor joist - proprietary external wall anchors to have a minimum capacity of:
- horizontal in plane of wall of 4 kN,
 - horizontal out of plane wall of 3 kN, and
 - vertical loads in axial tension of fastener of 6 kN
- Internal wall anchors to have a minimum capacity of:
- horizontal in plane of wall 2 kN,
 - horizontal out of plane wall of 2 kN, and,
 - vertical loads in axial tension of fastener of 4kN.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Carter Holt Harvey Plywood Limited or the building contractor, whether on site or off site, is under the control of the building contractor. Ecoply® Barrier for Steel panels must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Ecoply® Tapes must be protected from damage and weather and stored in clean, dry conditions away from direct exposure to sunlight. uPVC jointers must be protected from physical damage and should be stored flat and under cover.
- 5.2 Other accessories must be stored so they are kept clean, dry and undamaged.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Specification & Installation Guide which must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Specification & Installation Guide and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Ecoply® Barrier for Steel is intended for use as rigid wall underlay, air barrier and thermal break fixed over steel framed walls in order to resist wind pressures, and to act as a secondary barrier to wind-driven rain. When all joints are sealed with Ecoply® Tapes, flexible wall underlay is not required over Ecoply® Barrier Steel.
- 7.2 Commencing from installation, Ecoply® Barrier for Steel panels and Ecoply® Tapes must not be exposed to the weather for more than 180 days.
- 7.3 Ecoply® Barrier for Steel may be used as a temporary weather protecting sheathing to allow the insulation and internal lining of the building to proceed before the wall cladding is installed. To achieve temporary weathertightness, all joints, internal and external corners of Ecoply® Barrier for Steel must be sealed, the roof cladding and soffit linings must be installed, the flexible sill and jamb flashing tape system must be installed around the window and door openings, and the window and door joinery must be installed complete with head flashings and air seals. The wall framing must be thoroughly dry without any presence of moisture in the steel framing sections at the time of installing insulation and internal linings.
- 7.4 Ecoply® Barrier for Steel is suitable for use under wall claddings as a rigid wall underlay as called up in NZBC Acceptable Solution NASH Building Envelope Solutions, Table 23. Refer to Table 1.

Table 1: NASH Building Envelope Solutions Table 23 Requirements

NASH Building Envelope Solutions Table 23 Rigid Wall Underlay Properties	Property Performance Requirement	Ecoply® Barrier for Steel Actual Property Performance
Vapour Resistance	≤ 7 MN s/g	3.46 MN s/g
Absorbency	≥ 100 g/m ²	2261 g/m ²
Water Resistance	≥ 20 mm	Pass

Steel Framing

- 7.5 Steel framing must be either to a specific design in accordance with the NZBC and AS/NZS 1170 considering local factors or NASH Standard Part 2 2019. In all cases, framing members must be a minimum of grade G500 0.75 mm BMT and studs must be 90 mm in width and placed at a maximum of 600 mm centres. Dwargs must be fitted flush between the studs at maximum 1200 mm centres. [Note: The wall framing must also be suitable for the selected wall cladding. Refer to the selected cladding system's Technical Literature for specific framing requirements.]
- 7.6 Wall framing members where Ecoply® Barrier for Steel plywood panels are joined must have a minimum finished width of 40 mm.
- 7.7 Wall framing in all cases shall be set out to overhang the slab edge to provide a 6 mm anti-capillary gap to the lower edge of Ecoply® Barrier for Steel irrespective of proposed cladding selection.
- 7.8 Ecoply® Barrier for Steel plywood is treated with CCA preservative treatment. It is recommended that aluminium and steel elements positioned against the outside face of Ecoply® Barrier for Steel be isolated from the plywood by a suitable separation layer between the two items to avoid the potential for corrosion.

Ecoply® Barrier for Steel Set Out

- 7.9 All Ecoply® Barrier for Steel panel edges must be fully supported by framing.
- 7.10 Ecoply® Barrier for Steel panels must be installed with a 2-3 mm expansion gap between panels to accommodate any potential movement resulting from changes in climatic conditions.
- 7.11 Ecoply® Barrier for Steel must be installed vertically. At the base of the wall, the panels must hang below the bottom plate a minimum of 25 mm, up to a maximum of 40 mm.
- 7.12 On buildings intended to be clad with masonry veneer, extra allowance must be given to the width of the slab edge rebate to ensure a minimum of 40 mm of clearance from the face of the Ecoply Barrier for Steel panels to the interior face of the veneer.

Ecoply® Barrier for Steel Plywood and Cladding Fixing

- 7.13 Ecoply® Barrier for Steel panels must be fixed at a maximum of 150 mm centres around the perimeter of each panel and at maximum 300 mm centres to intermediate studs. In Extra High Wind Zones, the fixing centres on the intermediate studs must be reduced to a maximum of 150 mm centres. The fixings are at the same centres regardless of whether Ecoply® Barrier for Steel plywood is being used for bracing or not.
- 7.14 The length of the selected wall cladding fasteners must be increased by a minimum of 17 mm to maintain the face load strength of the wall cladding system.

Structure

Mass

- 8.1 The mass of Ecoply® Barrier for Steel is approximately 4.5 kg/m². This mass must be added to the selected wall cladding system mass when determining the overall wall cladding mass.

Wind Zones

- 8.2 Ecoply® Barrier for Steel is suitable for use in all Wind Zones of NASH Standard Part Two 2019, up to, and including, Extra High.

Bracing

- 8.3 The bracing units achieved (wind and earthquake) for Ecoply® Barrier for Steel are given in Table 2. The Technical Literature gives details of edge and end fixing distances and provides comprehensive construction and panel hold-down details.
- 8.4 The bracing units are derived from the BRANZ P21 test method based on a wall height of 2.4 m. For any other wall height, the bracing rating can be calculated by multiplying the appropriate value shown in table 2 by a factor $f=2.4$ and divided by the wall height in metres. Walls less than 2.4 m high shall be rated as if they were 2.4 m high.

Table 2: Bracing Ratings for Ecoply® Barrier for Steel Single Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	Bottom Plate Hold-down and Fixing	BU/m Wind	BU/m Earthquake
EPBS-1	0.6 m	17 mm Ecoply® Barrier for Steel one side	FRAMECAD® HDF-A1 Anchor	65	75
	1.2 m		FRAMECAD® HDF-A1 Anchor	90	90
EPBS-S	1.2 m		No Additional Fastening	70	65

Penetrations for Services

- 8.5 Small openings for services of up to 90 x 90 mm may be placed no closer than 90 mm to the edge of the bracing element and service penetrations up to a maximum of 150 mm diameter may be placed no closer than 150 mm for the panel edge, without affecting the bracing rating of the panel, with a maximum of one opening per bracing panel.

Durability

- 9.1 Ecoply® Barrier for Steel meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years when used where the cladding durability requirement or expected serviceable life is not less than 50 years, e.g. behind masonry veneer, or where it is used as a bracing element, and code compliance with NZBC Clause B2.3.1 [b], 15 years where the cladding durability requirement is 15 years and Ecoply® Barrier for Steel is not used as a bracing element.

Serviceable Life

- 9.2 Provided Ecoply® Barrier for Steel is not exposed to the weather or ultra-violet light for a total of more than 180 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Ecoply® Barrier for Steel is expected to have a serviceable life of at least 50 years.
- 9.3 Areas of geothermal activity and coastal locations can be very corrosive to fasteners, especially coastal locations within distances of up to 500 metres of the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets in some instances. These coastal locations are defined in NASH Standard Part Two 2019 as Zone D and stainless steel fasteners must be used. For installation in NASH Standard Part 2 2019 Climate Zones B and C, hot-dipped galvanised steel fasteners complying with the requirements of NASH Standard Part Two 2019 may be used.

Maintenance

- 10.1 Ecoply® Barrier for Steel will not normally require maintenance. However, if damage occurs to the cladding or lining protecting the sheathing or to the sheathing itself, then repairs or replacement must be carried out to ensure the integrity of the rigid air barrier.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Ecoply® Barrier for Steel and associated combustible materials from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1, C/AS2 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.
- 11.2 The EPS sheet used with the system meets the flame propagation criteria of AS 1366 as specified in NZBC Acceptable Solution C/AS1, Paragraph 4.2.2 or NZBC Acceptable Solutions C/AS2, Paragraph 4.17.2. The completed wall system, including the surface lining product enclosing the EPS sheet from the adjacent occupied space, must achieve the Group Number for internal surface finish requirements as specified in the relevant NZBC Acceptable Solutions C/AS1 and C/AS2.

External Moisture

- 12.1 Ecoply® Barrier for Steel must be used behind claddings that meet the performance requirements of NZBC Clause E2.
- 12.2 Ecoply® Barrier, when installed in accordance with the Installation Guide and this Appraisal, will assist in the total cladding system's compliance with NZBC Clause E2.

Internal Moisture

- 13.1 Ecoply® Barrier for Steel features a 10 mm layer of graphite infused EPS foam stapled to the back face of the plywood sheets that acts as a thermal break which provides an insulation value that meets the minimum R-value requirement of 0.25 m²°C/W given in E3/AS1. Ecoply Barrier Steel, when fixed over steel framing, meets the requirements of E3/AS1 for Housing and Communal Residential buildings as defined by NZBC clause A1.
- 13.2 Thermal breaks for buildings that are outside the definitions given for Housing or Communal Residential are outside the scope of this Appraisal and shall be specifically designed. Consideration in any specific design must be given to possibility of high internal moisture loads and high temperature differentials between inside and outside, both of which may promote condensation on steel framing members.

Installation Information

Installation Skill Level Requirements

- 14.1 Installation must always be carried out in accordance with the Ecoply® Barrier for Steel Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant License Class.

System Installation

Ecoply® Barrier Installation

- 15.1 Ecoply® Barrier for Steel plywood panels may be cut using any circular saw or hand saw tool. Holes and cut-outs may be formed by using a hole saw.
- 15.2 Panels must be dry prior to installation. Cut edges that are left exposed must be sealed in accordance with the Ecoply Barrier Steel Specification & Installation Guide prior to installation.
- 15.3 Prior to fixing Ecoply® Barrier for Steel panels, a check must be made to ensure all panel edges will be supported by framing. At the base of the wall, the panel must hang below the bottom plate by a minimum of 25 mm, up to a maximum of 40 mm.
- 15.4 Ecoply® Barrier for Steel panels must be fixed to the timber framing with screw fasteners meeting the specification given in Paragraph 4.2. Refer to Paragraph 7.12 for fixing centres and Paragraph 9.3 for material selection.
- 15.5 At vertical joints, Ecoply® Barrier for Steel must be installed with a 1.5-3.0 mm gap between the edges. Panels at horizontal joints between floor levels must be installed with a minimum 15 mm gap between the edges and must be supported over horizontal framing. All horizontal joints must be flashed with the Ecoply® Barrier for Steel Horizontal Jointer or with 150 mm wide Ecoply® Frame Sealing tape as detailed in the Ecoply Barrier Steel Specification & Installation Guide.

- 15.6 Any damaged areas of Ecoply® Barrier for Steel, or gaps around service penetrations, must be repaired by covering with joint sealing tape.

Joint Sealing Tape Installation

- 15.7 Ecoply® Barrier for Steel plywood panels must be cleaned of dust and other surface contaminants prior the application of the joint sealing tape to ensure adequate adhesion is achieved.
- 15.8 All vertical panel joints, internal and external corners, penetrations, and damaged areas must be covered with Ecoply® Sealing Tape. Over driven screws need not be covered with Ecoply® sealing tape unless the fastener head completely penetrates the face veneer. The manufacturer's instructions regarding the application temperatures for the joint sealing tapes must be followed.

Flexible Sill and Jamb Tape Installation

- 15.9 Ecoply® Sill Tape and Ecoply® Frame Flashing Tape must be installed in accordance with the Ecoply® Barrier for Steel Specification & Installation Guide. Particular attention must be paid to the installation of the sill and jamb tapes around window and door joinery openings to ensure all exposed steel framing in the opening is protected.
- 15.10 PVC cables must be prevented from direct contact with the EPS foam backing. A physical separation must be provided by placing cables within the wall cavity in a way they are prevented from contacting the EPS, or by wrapping the cables with a suitable separating material.

Inspections

- 15.11 The Ecoply® Barrier for Steel Specification & Installation Guide must be referred to during the inspection of Ecoply® Barrier for Steel installations.

Health and Safety

- 16.1 Ecoply® Barrier for Steel should be handled in accordance with the Material Safety Data Sheet for H3.2 CCA treated Ecoply®.
- 16.2 When power tools are used for cutting or forming holes, health and safety measures as set out in the Ecoply® Barrier for Steel Specification & Installation Guide must be undertaken because of the amount of dust generated.
- 16.3 Safe use and handling procedures for Ecoply® Barrier for Steel and the components that make up the cladding system are provided in the relevant manufacturer's Installation Guides.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 17.1 Racking tests were carried out in accordance with BRANZ Technical Paper P21. The earthquake and wind bracing ratings were determined using the evaluation procedures outlined in BRANZ Technical Recommendation No. 10. The test results and laboratory methods have been reviewed by BRANZ and found to be satisfactory.
- 17.2 Testing has been carried out by BRANZ to determine the face load pressure resistance of Ecoply® Barrier for Steel.
- 17.3 Testing to determine the resistance of Ecoply® Barrier for Steel plywood to water vapour transmission in accordance with AS/NZS 4200.1 and resistance to water penetration in accordance with AS/NZS 4201.4 has been completed. The results have been reviewed by BRANZ and found to be satisfactory.
- 17.4 Ecoply® Sealing Tape, Frame Flashing Tape and Sill Tape have been tested to BRANZ criteria to assess the tensile strength of control and UV aged material, water resistance of control and UV accelerated aged material and pliability. BRANZ has determined that the tapes are fit for purpose for the intended use. The adhesion to Ecoply® Barrier for Steel plywood and to steel framing has also been tested and found to be satisfactory.

Other Investigations

- 18.1 Structural and durability opinions were given by BRANZ technical experts.
- 18.2 An assessment was made of the durability of Ecoply® Barrier Tapes by BRANZ technical experts.
- 18.3 BRANZ expert opinion on NZBC E2 code compliance for Ecoply® Barrier for Steel was based on evaluation of all details within the scope and as stated within this Appraisal. The details contained within the Specification & Installation Guide have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NASH Building Envelope Solutions for a rigid wall underlay.
- 18.4 An assessment was made of the suitability of Ecoply® Barrier for Steel for use as a thermal break for steel framing by BRANZ technical experts.
- 18.5 Site inspections were carried out by BRANZ to assess the practicability of installation.
- 18.6 The Specification & Installation Guide for Ecoply® Barrier for Steel has been examined by BRANZ and found to be satisfactory.

Quality

- 19.1 The manufacture of Ecoply® Barrier for Steel plywood has been examined by BRANZ, including methods adopted for quality control. Details regarding the composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 19.2 The quality of materials, components and accessories supplied by Carter Holt Harvey Plywood Limited is the responsibility of Carter Holt Harvey Plywood Limited. The quality control system for the manufacture of the plywood used for Ecoply® Barrier for Steel has been assessed and registered as meeting the requirements of AS/NZS 2269 by the Engineered Wood Products Association of Australasia, Certificate No. 911.
- 19.3 The manufacture of Ecoply® Tapes has been examined on behalf of BRANZ, including methods adopted for quality control. Details of the quality and composition of the materials used were obtained and found to be satisfactory.
- 19.4 Quality of installation on site of components and accessories supplied by Carter Holt Harvey Plywood Limited and the building contractor is the responsibility of the installer.
- 19.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation in accordance with the instructions of Carter Holt Harvey Plywood Limited.

Sources of Information

- AS/NZS 1170: 2002 Structural design action – General principles.
- AS/NZS 1604.3 Specification for preservative treatment – Part 3: Plywood.
- AS/NZS 2269: 2012 Plywood - Structural.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – Materials.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- NASH Building Envelope Solutions.
- NASH Standard Part Two 2019.
- Ministry of Business, Innovation and Employment Record of amendments – Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 05 August 2020.

This Appraisal has been amended to update screw fastener specifications, revise references from E2/AS1 and NZS 3604 to NASH Building Envelope Solutions and NASH Standard Part Two.



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25 October 2018

ECOPLY® BARRIER FOR STEEL



In the opinion of BRANZ, **Ecoply® Barrier for Steel** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Carter Holt Harvey Plywood Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Carter Holt Harvey Plywood Limited:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions;
 - d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Carter Holt Harvey Plywood Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Carter Holt Harvey Plywood Limited** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

25 October 2018