



BRANZ Appraised

Appraisal No. 728 [2017]

FIRESTONE ULTRAPLY TPO 1.5 MM AND FIRESTONE ULTRAPLY TPO 1.14 MM MEMBRANES

Appraisal No. 728 [2017]

This Appraisal replaces BRANZ
Appraisal No. 728 [2011]

Amended 13 January 2022



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes are single-ply, adhesive-fixed, polyester weft reinforced, thermoplastic polyolefin (TPO) waterproofing sheet membranes for building roofs and decks.

Scope

- 2.1 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes have been appraised as roof and deck waterproofing membranes on buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; or,
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area when subject to specific structural design; and,
 - with substrates of plywood, Strandsarking (roofs only) or suspended concrete slab; and,
 - with minimum falls for roofs of 1:30, plywood decks of 1:40 and suspended concrete slab of 1:60; and,
 - with decks limited to 40 m²; and,
 - situated in NZS 3604 Wind Zones up to, and including, Extra High.
- 2.2 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes have also been appraised as roof and deck waterproofing membranes on buildings within the following scope:
 - subject to specific structural and weathertightness design; and,
 - with substrates of plywood, Strandsarking (roofs only) or suspended concrete slab; and,
 - situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 6 kPa; and,
 - with the weathertightness design of junctions for each specific structure being the responsibility of the building designer.
- 2.3 Roofs and decks waterproofed with Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes must be designed and constructed in accordance with the following limitations:
 - nominally flat roofs and decks and pitched roofs constructed to drain water to gutters and drainage outlets complying with the NZBC; and,
 - with no steps within the deck level, no integral roof gardens and no downpipes discharging directly onto the deck.
 - with the deck membrane continually protected from physical damage by a pedestal protection system.

- 2.4 The design and construction of the substrate and movement and control joints is specific to each building, and therefore the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.5 The membranes must be installed by ARDEX New Zealand Limited approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes meet these requirements. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1, E2.3.2 and E2.3.6. Roofs and decks incorporating Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes meet these requirements. See Paragraphs 13.1–13.8.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes meet this requirement.

Technical Specification

- 4.1 Materials supplied by ARDEX New Zealand Limited are as follows:
- **Firestone Ultraply TPO 1.5 mm Membrane** - a fully-adhered roof and deck waterproofing system based on a TPO sheet, with non-halogenated flame retardants laminated around a polyester weft reinforcement. It is supplied in grey or white in rolls 1.5 mm thick, 2 m wide and 30.5 m long.
 - **Firestone Ultraply TPO 1.14 mm Membrane** - a fully-adhered roof and deck waterproofing system based on a TPO sheet, with non-halogenated flame retardants laminated around a polyester weft reinforcement. It is supplied in grey or white rolls 1.14 mm thick, 2 m wide and 30.5 m long.
 - **TPO Unreinforced Flashing** - a non-reinforced TPO membrane designed to be used in situation where a pre-moulded accessory is not available. It is supplied as a 0.61 m x 15.25 m roll in colours of white and grey.
 - **TPO Inside/Outside Corners** - made from a flexible non reinforced TPO and are specifically designed for flashing inside or outside corners. They are supplied as a 76 mm x 76 mm x 82 mm corner with a 12.7 mm radius on all edges of the raised corner, in colours of white or grey.
 - **TPO Universal and Large Pipe Flashing** - TPO membrane flashings, designed for flashing pipe penetrations. The universal is used for flashing pipe penetrations with an outside diameter of 25.4 mm to 152.4 mm; the large is used for flashing pipe penetrations with an outside diameter of 101.6 mm to 203.2 mm. They are supplied in colours of white and grey.
 - **TPO QuickSeam Flashing** - a non-reinforced TPO membrane laminated to a white cured seaming tape for flashing metal roof edging profiles and other details as indicated by ARDEX New Zealand Limited. It is supplied as a 0.14 m x 30.5 m roll, in white.
 - **TPO Bonding adhesive** - for bonding TPO membranes to approved insulations, wood, metal, masonry and other acceptable substrates. It is supplied as a yellow colour in 18.9 L pails.
 - **TPO Cut Edge Sealant** - a polymer-based sealant designed to seal cut edges of TPO membranes where the scrim reinforcement is exposed. It is supplied as white or grey, in cartons of 4 bottles.
 - **TPO General Purpose Sealant** - a high quality sealant with excellent adhesion to a variety of surfaces, used as a termination bar caulk and cut edge/seam sealant. It is supplied in cartridges, coloured white.
 - **TPO Pourable Sealant** - a two-component polyurethane sealer designed to seal around small pipe penetrations, clusters of pipes, I beams etc. in a penetration pocket detail. It is supplied in 3.78 L packs and is coloured black.
 - **All Purpose Fasteners** - specifically designed for mechanical attachment of the TPO membranes to steel, plywood and timber decks. They are supplied as 32 mm long screws, coloured red.



- **HD Seam Plate** - specifically designed to be used for the attachment of TPO membranes to approved substrates using ARDEX All Purpose Fasteners. They are supplied as 60.3 mm diameter plates.
- **Pressure Seal** - designed for termination of TPO membranes against smooth walls in all roofing situation. They are supplied as 3.1 m x 35 mm x 2.2 mm thick bars.

Handling and Storage

- 5.1 Handling and storage of all materials, whether on-site or off-site, is under the control of the trained applicators, approved by ARDEX New Zealand Limited. Dry storage must be provided for all products and the rolls of membrane must be lying down on pallets.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes are for use on roofs and decks where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.
- 7.2 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes can be adversely affected by contact with bituminous materials or polystyrene insulation. ARDEX New Zealand Limited should be contacted for advice in either of these situations.
- 7.3 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membrane. Refer to the BRANZ Good Practice Guide: Membrane Roofing.
- 7.4 Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and that all sheet edges are fully supported.
- 7.5 Roofs where regular foot traffic is envisaged i.e. maintenance of lift equipment, a walkway over the membrane should be used to ensure the membrane is protected. Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes are designed for limited, irregular pedestrian access only.
- 7.6 Decks must always be protected by a pedestal protection system.

Structure

- 8.1 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes fully bonded are suitable for use in areas subject to maximum wind pressure of 6 kPa ULS subject to the limitations of the substrate.

Substrates

Plywood

- 9.1 Plywood must be treated to H3 (CCA treated). LOSP treated plywood must not be used. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and that all sheet edges are fully supported.



Strandsarking

- 9.2 Strandsarking must be installed in accordance with the manufacturer's instructions and BRANZ Appraisal No. 946.

Concrete

- 9.3 Concrete substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101.

Durability

Serviceable Life

- 10.1 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes when subjected to normal conditions of environment and with proper maintenance can expect to have a serviceable life of at least 15 years.

Maintenance

- 11.1 Maintenance requirements of the membrane are provided by ARDEX New Zealand Limited.
- 11.2 In the event of damage to the membrane, the membrane must be repaired by removing the damaged portion and applying a patch as for new work.
- 11.3 Drainage outlets must be maintained to operate effectively.

Prevention of Fire Occurring

- 12.1 Separation or protection must be provided to the Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 13.1 Roofs and decks must be designed and constructed to shed precipitated moisture. They must also take account of snowfalls in snow prone areas. A means of meeting code compliance with NZBC Clause E2.3.1 is given by the Technical Literature.
- 13.2 When installed in accordance with this Appraisal and the Technical Literature, Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes will prevent the penetration of water and will therefore meet code compliance with NZBC Clause E2.3.2. The membranes are impervious to water and will give a weathertight roof or deck.
- 13.3 Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes are impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with NZBC Clause E2.3.6.
- 13.4 The minimum fall for roofs is 1 in 30. The minimum fall for plywood decks is 1 in 40, suspended concrete slab 1 in 60, and gutters 1 in 100. All falls must slope to an outlet. Inadequate falls will allow moisture to collect and increase the risk of deterioration of the membrane. *[Note: Where possible, BRANZ recommends falls in gutter to be 1 in 60.]*
- 13.5 Falls must be built into the plywood or Strandsarking substrate.
- 13.6 Drainage flanges must be used for any outlet and must be fitted with a grate or cage to reduce potential sources of blockages. An overflow must be provided where the roof or deck does not drain to an external gutter or spouting.
- 13.7 Penetrations and upstands of the membrane must be raised above the level of any possible flooding caused by blockage of roof drainage.
- 13.8 The design of details not covered by the Technical Literature is subject to specific weathertightness design and is outside the scope of this Appraisal.

Installation Information

Installation Skill Level Requirement

- 14.1 Installation of the membranes must be completed by trained applicators, approved by ARDEX New Zealand Limited.
- 14.2 Installation of substrates must always be carried out in accordance with the Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant Licence Class.

Preparation of Substrates

- 15.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents. All surface defects must be filled to achieve an even and uniform surface.
- 15.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 585.
- 15.3 The moisture content of a timber substructure must be a maximum of 20% and the plywood or Strandsarking sheet must be dry at time of membrane application. This will generally require plywood or Strandsarking sheets to be covered until just before the membrane is laid, to prevent rain wetting.

Membrane Installation

- 16.1 The installation of these membrane systems is very complex and limited to trained and approved applicators only. The TPO Technical Guidelines Manual should be referred in all instances for the correct procedures.

Inspections

- 17.1 Critical areas of inspection for waterproofing systems are:
 - Construction of substrates, including crack control and installation of bond breakers and movement control joints.
 - Moisture content of the substrate prior to the application of the membrane.
 - Acceptance of the substrate by the membrane installer prior to application of the membrane.
 - Installation of the membrane to the Technical Literature instructions.

Health and Safety

- 18.1 Safe use and handling procedures for the membrane system is provided in the Technical Literature. The products must be used in conjunction with the relevant Materials Safety Data Sheet.

Basis of Appraisal

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

Tests

- 19.1 Testing has been carried out on the membranes by various organisations for tensile strength, elongation, joint peel and shear strength, cold bending after ultraviolet [UV] aging, static load resistance, water pressure resistance, water vapour permeability, shear/joint strength, adhesion to plywood, peel adhesion, resistance to aging, resistance to impact, resistance to frost, resistance to freeze/thaw, elongation, seam strength, breaking strength, low temperature brittleness point, water absorption and resistance to UV.
- 19.2 Results and test methods have been reviewed by BRANZ and found to be satisfactory.



Other Investigations

- 20.1 A durability opinion has been given on Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes by BRANZ technical experts.
- 20.2 Site inspections have been carried out by BRANZ to examine the practicability of installation, and to examine completed installations.
- 20.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 21.1 The manufacture of the Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 21.2 The quality of supply of the product to the market is the responsibility of ARDEX New Zealand Limited.
- 21.3 Quality on-site is the responsibility of trained installers, approved by ARDEX New Zealand Limited.
- 21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, ARDEX New Zealand Limited and this Appraisal.

Sources of Information

- AS/NZS 1170:2002 Structural Design action – general principles.
- AS/NZS 2269:2012 Plywood – structural.
- BRANZ Appraisal No. 946 Strandsarking for Low Slope Membrane Roofs.
- BRANZ Good Practice Guide: Membrane Roofing (Second Edition), October 2015.
- NZS 3101:2006 Concrete structures standard.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 06 August 2021.

This Appraisal has been amended to reflect building code updates relating to fire.

Amendment No. 2, dated 13 January 2022.

This Appraisal has been amended to update the product names.



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17 January 2018

FIRESTONE ULTRAPLY TPO
1.5 MM AND FIRESTONE
ULTRAPLY TPO 1.14 MM
MEMBRANES



In the opinion of BRANZ, **Firestone Ultraply TPO 1.5 mm and Firestone Ultraply TPO 1.14 mm Membranes** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **ARDEX New Zealand 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. **ARDEX New Zealand 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 **ARDEX New Zealand 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 **ARDEX New Zealand Limited** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

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17 January 2018