



BRANZ Appraised
Appraisal No. 950 [2017]

duroTUF TPO WATERPROOFING MEMBRANE



Appraisal No. 950 [2017]

Amended 24 May 2018

BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 duroTUF TPO Membrane is a single ply, polyester fabric reinforced, thermoplastic polyolefin (TPO) fully bonded waterproofing sheet membrane for roofs and decks.

Scope

- 2.1 duroTUF TPO Membrane has been appraised as roof and deck waterproofing membrane on buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; or,
 - the scope of 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 and decks of 1:40; and,
 - with deck size limited to 40 m²; and,
 - situated in NZS 3604 Wind Zones, up to, and including Extra High.
- 2.2 duroTUF TPO Membrane has also been appraised as roof and deck waterproofing membrane 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 3 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 duroTUF TPO Membrane 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 downpipe direct discharge to decks; and,
 - with the deck membrane continually protected from physical damage by a pedestal protection or ABS uncoupling system.
- 2.4 The design and construction of the substrate and movement and control joints is specific to each building, and therefore is the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.
- 2.5 The membrane must be installed by Waterproofing Systems [NZ] Ltd Approved Applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, duroTUF TPO Membrane, 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. duroTUF TPO Membrane meet this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1, E2.3.2 and E2.3.6. Roofs incorporating duroTUF TPO Membrane meet these requirements. See Paragraphs 13.1 – 13.4.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. duroTUF TPO Membrane meet this requirement and will not present a health hazard to people.

Technical Specification

4.1 Materials supplied by Waterproofing Systems [NZ] Ltd are as follows:

- **duroTUF TPO Membrane** – is a fully adhered, polyester fabric reinforced, multilayer, synthetic roof waterproofing sheet based on thermoplastic polyolefin (TPO). It is supplied in grey, or white rolls either 1.14, 1.52 or 2.0 mm thick, 1.52, 2.44 or 3.05 m wide and 30.4 m long.
- **duroTUF TPO FB Membrane** – is a fully adhered, polyester fabric reinforced, multilayer, synthetic roof waterproofing sheet based on thermoplastic polyolefin (TPO) with a fleece backing. It is supplied in white rolls 3.0 mm thick, 3.05 m wide and 30.4 m long.
- **Vent Tapes** – PVC bondbreaker tapes for plywood joints to allow movement over substrate joints and air travel underneath the membrane or used in a grid pattern at 600 mm centres over concrete to allow air movement to exit to vents. They are supplied in 30 mm widths.
- **duroTUF TPO Weathered Membrane Cleaner** – a cleaner designed for cleaning aged, dirty or weathered membranes
- **duroTUF TPO Contact Adhesive** – is a high strength, solvent based contact adhesive that is used to bond duroTUF TPO Membrane to various porous or non-porous substrates. It is supplied as an opaque liquid in 19 litre containers.
- **duroTUF Single Ply Caulk** – is a one-part elastomeric sealant, specially formulated for TPO edge sealing. It is used to seal edges around flashing terminations. It is coloured white in 304.6 ml cartridges.
- **duroTUF TPO Pourable Sealer** – is a two-part polyurethane sealant used as a penetration pocket filler. It is a grey colour supplied in 4.26 litre kit.
- **duroTUF TPO Penetration Pocket** – is a two piece moulded TPO pocket used to seal uneven penetrations. It is coloured white, supplied as 190.0 x 150.0 oval.
- **duroTUF TPO Detail Membrane** – a weldable unreinforced TPO for corner, detail and flashing areas. It is supplied as a roll 300 m wide.
- **duroTUF TPO Preformed Corners and T Joint Patches** – are flexible, non-reinforced TPO detailing accessories. They are available in white, grey and tan.
- **duroTUF TPO Pipe Boots** – are flexible, smooth, non-reinforced TPO cone shaped boot with a preformed flange. They are coloured white, grey or tan and supplied in 25.4 mm to 152.4 mm diameter boots.
- **duroTUF TPO Pipe Boots (Peel & Stick)** – are flexible, smooth, non-reinforced TPO cone shaped boot with a preformed flange with a pressure sensitive tape on the underside. They are coloured white, grey or tan and supplied in 25.4 mm to 152.4 mm diameter boots.
- **duroTUF TPO Peel & Stick 6" Reinforced Perimeter Strip** – is a reinforced TPO membrane with a factory applied peel and stick adhesive tape on the upper face. It is coloured white, supplied in rolls 152.0 mm wide and 30.48 m
- **duroTUF TPO Cover Tape** – is a non-reinforced TPO detailing tape with a peel and stick adhesive backing. It is coloured white, grey or tan, supplied in rolls 152.4 or 250 mm wide and 30.48 m long.



- ABS uncoupling system - consisting of:
 - ABS uncoupling mat.
 - ABS PSA adhesive.
 - ABS joint finishing tape.

Handling and Storage

- 5.1 Handling and storage of all materials whether on or off site is under the control of the Waterproofing Systems [NZ] Ltd Approved Applicators. Dry storage must be provided for all products and the rolls of membrane must be lying down on pallets and protected.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the duroTUF TPO Membrane. 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 duroTUF TPO Membrane is for use on roofs, decks, balconies, gutters and parapets where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.
- 7.2 duroTUF TPO Membrane can be adversely affected by contact with bituminous substances. The membrane supplier should be contact for advice in this situation.
- 7.3 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membrane. Refer to BRANZ publication Good Practice Guide: Membrane Roofing.
- 7.4 Where regular foot traffic on the roof is envisaged i.e. maintenance of lift equipment, a walkway should be installed to ensure the membranes are protected. The duroTUF TPO Membrane is designed for limited, irregular pedestrian access only.
- 7.5 duroTUF TPO Membrane when used on decks requires a pedestal protection or ABS uncoupling system. Waterproofing Systems [NZ] Ltd should be contacted for the best system to meet design requirements.

Structure

- 8.1 Timber framing systems 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.
- 8.2 duroTUFF TPO Membrane fully bonded are suitable for use in areas subject to maximum wind pressure of 3 kPa Ultimate Limit State subject to the limitations of the substrate.

Substrates

Plywood

- 9.1 Plywood must be treated to H3 [CCA treated]. LQSP 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 [2016].

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 duroTUF TPO Membrane 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 the membrane supplier.
11.2 In the event of damage to the membrane, it 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 duroTUF TPO Membrane must be separated from fireplaces, heating appliances, flues and chimneys in accordance with the requirements of NZBC Acceptable Solutions C/AS1 to C/AS6, Paragraph 7.5.9 for the protection of combustible materials.

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, duroTUF TPO Membrane 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 The minimum fall for roofs is 1 in 30, for decks 1 in 40 and for gutters is 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 recommend a fall of 1:60 for gutters.
13.4 duroTUF TPO Membrane is 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.
13.5 Roof and deck falls must be built into the plywood 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 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 Waterproofing Systems [NZ] Ltd approved applicators.
14.2 Installation of substrates must be completed by or under the supervision of Licensed Building Practitioners with the relevant License Class, in accordance with instructions given within the Waterproofing Systems [NZ] Ltd Technical Literature and this Appraisal.

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 Concrete substrates can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 585. The relative humidity of the concrete must be 75% or less before membrane application.
- 15.3 The moisture content of a timber substructure must be a maximum of 20% and plywood sheet must be dry at time of membrane application. This will generally require plywood sheets to be covered until just before the membranes are laid, to prevent rain wetting.

Membrane Installation

- 16.1 The installation of these membrane systems are very complex and limited to approved applicators only. The Waterproofing Systems [NZ] Ltd Application 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 systems is provided in the Technical Literature. The product 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 membrane for elongation, tensile strength, seam strength, breaking strength, low temperature, resistance to aging, water absorption, resistance to UV and peel adhesion to plywood and concrete.
- 19.2 Test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 20.1 A durability opinion has been given of the duroTUF TPO Membrane by BRANZ technical experts.
- 20.2 Site visits have been carried out by BRANZ to assess 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 duroTUF TPO Membrane 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 Waterproofing Systems [NZ] Ltd.
- 21.3 Quality on site is the responsibility of the Waterproofing Systems [NZ] Ltd Approved Applicators.
- 21.4 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Waterproofing Systems [NZ] Ltd and this Appraisal.



Sources of Information

- AS/NZS 2269: 2012 Plywood – Structural.
- BRANZ Good Practice Guide – Membrane Roofing, October 2015.
- AS/NZS 1170: 2002 Structural Design action – general principles.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3604: 2011 Timber Framed Buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 05 April 2017.

This Appraisal has been amended to add the ABS uncoupling system.

Amendment No. 2, dated 24 May 2018.

This Appraisal has been amended to include Strandsarking as an acceptable substrate.



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01 February 2017

duroTUF TPO WATERPROOFING
MEMBRANE



In the opinion of BRANZ, **duroTUF TPO Waterproofing Membrane** 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 **Waterproofing Systems [NZ] Ltd**, 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. **Waterproofing Systems [NZ] Ltd**:
 - 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 **Waterproofing Systems [NZ] Ltd**.
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 **Waterproofing Systems [NZ] Ltd** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

01 February 2017