



**BRANZ Appraised**

Appraisal No.792 [2012]

BRANZ Appraisals

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
No. 792 (2012)**

Amended xx March 2015

**ECOTUFF TPO  
ROOF AND DECK  
MEMBRANE**

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## Product

1.1 EcoTUFF TPO Roof and Deck Membrane is a single ply, polyester fabric reinforced, thermoplastic polyolefin (TPO) fully bonded roof waterproofing sheet membrane for building roofs and decks.



## Scope

2.1 EcoTUFF TPO Roof and Deck Membrane has been appraised as a 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 limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with respect to building height and maximum floor plan areas when subject to specific design; and,
- with building structures designed and constructed to meet the requirements of the NZBC; and,
- with substrates of plywood or concrete slab; and,
- with minimum falls for roofs of 1:30 and decks of 1:40; and,
- with decks that have a maximum area of 40 m<sup>2</sup>; and,
- situated in NZS 3604 Wind Zones, up to, and including Extra High.

2.2 EcoTUFF TPO Roof and Deck Membrane has also been appraised for use as a roof and deck waterproofing membrane on specifically designed buildings within the following scope:

- subject to specific structural and weathertightness design; and,
- with substrates of plywood or concrete slab; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 6.0 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 EcoTUFF TPO Roof and Deck Membrane must be designed and constructed in accordance with the following limitations:

- nominally flat or pitched roofs and decks 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 the decks; and,
- with the deck membrane continually protected from physical damage by pedestal protection 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 Ltd Approved Installers.

## Building Regulations

### New Zealand Building Code (NZBC)

**3.1** In the opinion of BRANZ, EcoTUFF TPO Roof and Deck 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. EcoTUFF TPO Roof and Deck Membrane meets this requirement. See Paragraph 10.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.1, E2.3.2 and E2.3.6. Roofs incorporating EcoTUFF TPO Roof and Deck Membrane meet these requirements. See Paragraphs 13.1 - 13.4.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. EcoTUFF TPO Roof and Deck Membrane meets this requirement and will not present a health hazard to people.

**3.2** This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

## Technical Specification

**4.1** Materials supplied by Waterproofing Systems Ltd are as follows:

- **EcoTUFF TPO Roof and Deck Membrane** - is fully adhered polyester fabric reinforced, multilayer, synthetic roof waterproofing sheet based on thermoplastic polyolefin (TPO). It is supplied in grey, tan or white rolls either 1.14 or 1.52 mm thick, 1.8, 2.4, 3.0 or 3.7 m wide and 15.2 or 30.4 m long.
- **Vent Tapes** - PVC breaker tapes for plywood joints to allow movement over substrate joints and air travel underneath the membrane or used in a grid pattern at 600mm centres over concrete to allow air movement to exit to vents. They are supplied in 25 - 50 mm widths.
- **EpiSPAN EPDM Weathered Membrane Cleaner** - a cleaner designed for cleaning aged, dirty or weathered membranes
- **EpiBOND EPDM & TPO Contact Adhesive** - is a high strength, solvent based contact adhesive that is used to bond EcoTUFF TPO Roof and Deck Membrane to various porous or non porous substrates. It is supplied as an opaque liquid in 19 litre containers.
- **EcoTUFF TPO Cut Edge Sealant** - a specially formulated EpiSPAN EPDM edge sealer designed for use in water diversion applications. This sealant is not designed to seal against leakage but is more designed to divert water away from laps or flashing details
- **Unreinforced Flashing TPO** - a weldable unreinforced TPO for corner, detail and flashing areas. It is supplied as a roll 300m wide.
- **Preformed internal and external corners.**
- **TPO welded vents.**

### Handling and Storage

**5.1** Handling and storage of all materials whether on or off site is under the control of the Waterproofing Systems Ltd Approved Installers. 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 EcoTUFF TPO Roof and Deck 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** EcoTUFF TPO Roof and Deck Membrane is for use on roofs and decks where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.

**7.2** EcoTUFF TPO Roof and Deck Membrane can be adversely affected by contact with bituminous or polystyrene insulation; the membrane supplier should be contact 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 BRANZ publication "Good Practice Guide to Membrane Roofing".

**7.4** 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.

**7.5** Where regular foot traffic is envisaged i.e. maintenance of lift equipment, a walkway should be installed to ensure the membrane is protected. The EcoTUFF TPO Roof and Deck Membrane is designed for limited, irregular pedestrian access only.

**7.6** Decks must always be protected by a pedestal protection system.

### Structure

**8.1** EcoTUFF TPO Roof and Deck Membrane fully bonded is suitable for use in areas subject to maximum wind pressure of 6 kPa Ultimate Limit State 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.

#### Concrete

**9.2** 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 EcoTUFF TPO Roof and Deck 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, 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 EcoTUFF TPO Roof and Deck Membrane from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 - C/AS6 and NZBC Verification Method C/VM1 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, EcoTUFF TPO Roof and Deck Membrane will prevent the penetration of water and will therefore meet code compliance with NZBC Clause E2.3.2. The membrane is impervious to water and will give a weathertight roof or deck.

13.3 The minimum fall for roofs is 1 in 30, for decks is 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 EcoTUFF TPO Roof and Deck 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.

### Water Supplies

14.1 Water is not contaminated by EcoTUFF TPO Roof and Deck Membrane.

14.2 The first 25 mm of rainfall from a newly installed EcoTUFF TPO Roof and Deck Membrane roof must be discarded before drinking water collection starts. This is to remove residues which may have developed in the processes involved in the production of a EcoTUFF TPO Roof and Deck Membrane roof.

14.3 Though EcoTUFF TPO Roof and Deck Membrane won't contaminate water, it must be noted that all water collected off roof surfaces made from any material is considered to be non-potable due to possible contamination from other sources. Water collection in this way can only be considered potable if it has been passed through a suitable sterilisation system. Sterilisation systems such as this have not been assessed and are outside the scope of this Appraisal.

## Installation Information

### Installation Skill Level Requirement

15.1 Installation of the membrane must be completed by approved installers by Waterproofing Systems Ltd.

15.2 Installation of substrates must be completed by tradespersons with an understanding of roof construction, in accordance with instructions given within the Waterproofing Systems Ltd Technical Literature and this Appraisal.

### Preparation of Substrates

16.1 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.

16.2 Concrete substrates can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 424. The relative humidity of the concrete must be 75% or less before membrane application.

16.3 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 membrane is laid, to prevent rain wetting.

### Membrane Installation

17.1 The installation of this membrane system is very complex and limited to trained applicators only; the EcoTUFF TPO Roof and Deck Membrane Applicators Manual should be referred in all instances for the correct procedures.

### Inspections

18.1 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

19.1 Safe use and handling procedures for the membrane system 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

20.1 Testing has been carried out on the membrane by various organisations for shear/joint strength, adhesion, peel resistance, resistance to aging, resistance to UV, elongation, tensile strength, seam strength, breaking strength, low temperature resistance, static puncture resistance, dynamic puncture resistance and artificial weathering followed by tensile strength, elongation and low temperature flexibility retention. Results and test methods have been reviewed by BRANZ and found to be satisfactory.

## Other Investigations

- 21.1 A durability opinion has been given of the EcoTUFF TPO Roof and Deck Membrane by BRANZ technical experts.
- 21.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 21.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

## Quality

- 22.1 The manufacture of the EcoTUFF TPO Roof and Deck 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.
- 22.2 The quality of supply of the product to the market is the responsibility of Waterproofing Systems Ltd.
- 22.3 Quality on site is the responsibility of the Waterproofing Systems Ltd Approved Installers.
- 22.4 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 Ltd and this Appraisal.

## Sources of Information

- AS/NZS 2269: 2008 Plywood - Structural.
- BRANZ Good Practice Guide - Membrane Roofing, reprint October 2003.
- AS/NZS 1170: 2002 Structural Design action - general principles.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3604: 2011 Timber Framed Buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 (including Amendment 5, 1 August 2011).
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

### Amendment No. 1, dated 30 October 2013.

This Appraisal has been amended to update clause changes as required by the introduction of NZBC Fire Clauses C1 - C6 Protection from Fire and A3 Building Importance Levels.

### Amendment No. 2, dated xx March 2015.

This Appraisal has been amended to add decks to the scope.



# BRANZ

In the opinion of BRANZ, **EcoTUFF TPO Roof and Deck 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 Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

- This Appraisal:
  - relates only to the product as described herein;
  - must be read, considered and used in full together with the technical literature;
  - does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - is copyright of BRANZ.
- Waterproofing Systems Ltd:**
  - continues to have the product reviewed by BRANZ;
  - shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - abides by the BRANZ Appraisals Services Terms and Conditions.
  - 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.
- BRANZ makes no representation or warranty as to:
  - the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - any guarantee or warranty offered by **Waterproofing Systems Ltd**.
- 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.
- BRANZ provides no certification, guarantee, indemnity or warranty, to **Waterproofing Systems Ltd** or any third party.

For BRANZ

P Burghout  
Chief Executive

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