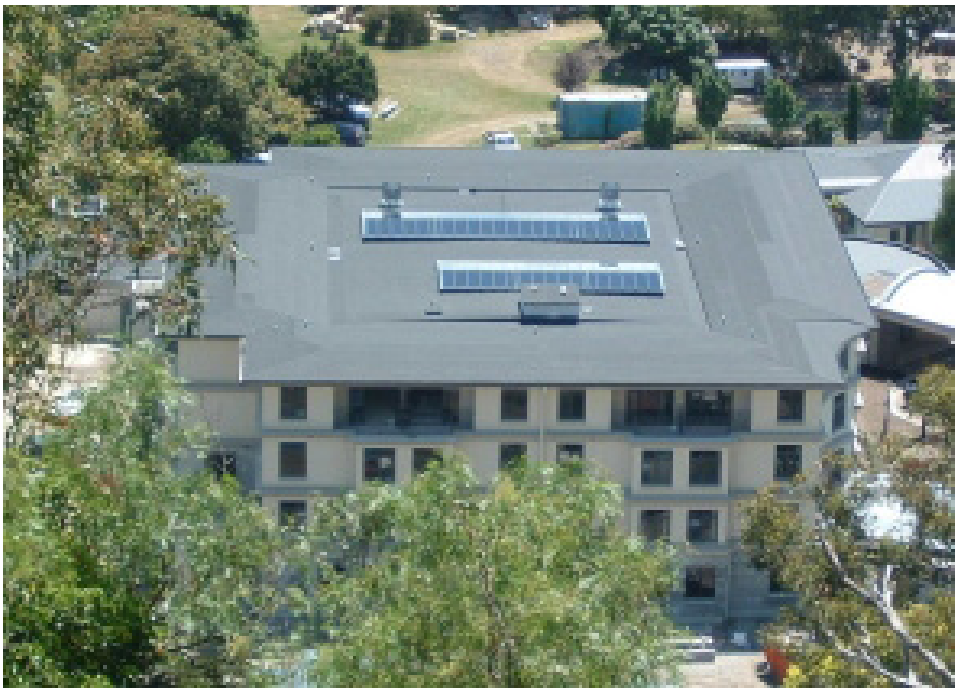
BRANZ Appraised
Appraisal No. 404 [2019]

BITUFLAME® ROOF AND DECK MEMBRANES



Appraisal No. 404 (2019)

This Appraisal replaces BRANZ Appraisal No. 404 (2014).

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 bituFLAME® Roof and Deck Membranes are waterproofing membranes for nominally flat and pitched roofs and decks. They are installed as a multi-layer system with either a mineral chip finished product or UV protective paint as the top layer, or as a single layer system onto a concrete substrate under heavy protection such as paving slabs or a topping screed.

Scope

2.1 bituFLAME® Roof and Deck 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 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 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 m^2; and,
- situated in NZS 3604 Wind Zones, up to, and including Extra High.

2.2 bituFLAME® Roof and Deck 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 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 bituFLAME® Roof and Deck Membranes 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 deck; and,
- with the deck membranes 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 membranes must be installed by Waterproofing Systems NZ Ltd Trained and Approved Installers.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, bituFLAME® Roof and Deck Membranes, if designed, used, 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 B2 DURABILITY: Performance B2.3.1 (b), 15 years. bituFLAME® Roof and Deck Membranes meet this requirement. See Paragraph 10.1. Performance B2.3.1 (c), 5 years. Alugard and duroTUF® meet this requirement. See Paragraph 10.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. bituFLAME® Roof and Deck Membranes meet these requirements. See Paragraphs 13.1 – 13.9.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. bituFLAME® Roof and Deck Membranes 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:

- **bituFLAME® CS** - These are torch-on membranes either 3.0 or 4.0 mm thick with a sanded upper layer and 180 - 200 g/m^2 spun-bonded polyester fabric reinforcement. They are available in 10 m x 1 m rolls.
- **bituFLAME® CS Granule Membrane** - A 4.0 mm thick torch-on membrane with a mineral chip finished top surface and a thermofusible polyethylene foil film backing. It is available in white, green, terracotta or black mineral chip finish.
- **bituFLAME® BS Membrane** - A 2.0 or 3.0 mm thick membrane with a polythene top surface and 60 g/m^2 glassfibre mat reinforcement. It is available in 20 m x 1 m rolls and 10 m x 1 m rolls.
- **bituPRIME Primer** - A solvent-based, fast drying bituminious primer designed to penetrate concrete or plywood surfaces and provide a bondable surface. It is available in 20 litre cans.
- **Alugard UV Coating** - A non-fibred aluminium paint to protect membranes from UV. It is supplied in 20 litre pails.
- **duroTUF® UV Coating** - duroTUF is only used on mineral chip finishes with a specified primer.
- **bituBOND® Adhesive** - A water-based bitumen adhesive used for glue fixing torch-on membranes to gutters, parapets and other difficult detailing areas.

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 trained installers. Dry storage must be provided for all products and the rolls of membrane must be stored in an upright position.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the bituFLAME® Roof and Deck 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 bituFLAME® Roof and Deck Membranes are for use on roofs, decks, gutters and parapets where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas. The products can be used on new or existing buildings. Waterproofing Systems NZ Ltd should be consulted as to the suitability of any existing substrates prior to using bituFLAME® Roof and Deck Membranes.

7.2 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membranes. Refer to BRANZ publication "Good Practice Guide - Membrane Roofing".

7.3 There are a number of different base sheets and cap sheets contained within the bituFLAME® Roof and Deck Membranes. Generally the cap sheet have a mineral chip finish for UV protection. All the systems require a pedestal protection system for when anything other than irregular maintenance foot traffic is expected. When the deck membrane system is two layers of plain membrane, this system requires UV protection as well as the pedestal protection system. Waterproofing Systems NZ Ltd should be consulted for the best system to meet the design requirements.

Structure

8.1 bituFLAME® Roof and Deck Membranes as fully bonded single or double layer systems are suitable for use in areas subject to maximum wind pressures of 6 kPa Ultimate Limit State.

Substrates

Plywood

9.1 Plywood must be treated to H3 (CCA treated). LOSP treated plywood must not be used. Plywood must comply with NZBC Acceptable Solution E2/AS1, Paragraph 8.5.3 and 8.5.5. Where specific design is used (i.e. outside the scope of E2/AS1) the plywood thickness and fixing size may increase and centres may decrease to meet specific wind loadings. 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 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.

Existing Construction

9.3 A thorough inspection of the substrate must be made to ensure it is in fit condition and does not contain any materials that will adversely affect the performance of the membrane.

9.4 Repairs must be undertaken, where applicable, to ensure the substrate is sound, the joints are sealed, and the flashings are sound. Plywood substrates must be checked for screw fixings, and if necessary refixed as for new plywood.

Durability

Serviceable Life

10.1 bituFLAME® Roof and Deck Membranes are expected to have a serviceable life of at least 15 years, provided they are designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

10.2 Alugard and duroTUF® are expected to have a serviceable life of at least 5 years provided they are used, installed and maintained in accordance with this Appraisal and the Technical Literature.

Chemical Resistance

10.3 Industrial air pollutants and windborne salt deposits should not significantly affect the durability of the membranes. However, the long term properties of the material may be affected by contact with petroleum-based products such as oils, greases and solvents.

Maintenance

11.1 The membrane roof and deck systems, including any areas with a UV coating applied, must be regularly (at least annually) checked for damage, rubbish, debris or coating breakdown. Damage, such as small punctures and tears must be repaired and coatings reapplied as recommended by Waterproofing Systems NZ Ltd.

11.2 Special care must be taken when inspecting the membrane roof systems to ensure the continuing prevention of moisture ingress, and repairs must be undertaken where required.

11.3 Drainage outlets must be maintained to operate effectively.

Prevention of Fire Occurring

12.1 Separation or protection must be provided to bituFLAME® Roof and Deck Membranes from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 and C/AS2, 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 which aligns with details in NZBC Acceptable Solution E2/AS1.

13.2 When installed in accordance with this Appraisal and the Technical Literature, bituFLAME® Roof and Deck Membranes will prevent the penetration of water and will therefore meet code compliance with Clause E2.3.2. The membranes are impervious to water and will give a weathertight roof.

13.3 Roof and deck falls must be built into the substrate.

13.4 The minimum fall to roofs is 1 in 30, decks 1 in 40 and gutters are 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 a fall of 1 in 60 in the gutters is preferred.

13.5 Allowance for deflection and settlement of the substrate must be made in the design of the roof to ensure falls are maintained and no ponding of water can occur.

13.6 bituFLAME® Roof and Deck Membranes are impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with Clause E2.3.6.

13.7 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.

13.8 Penetrations and upstands of the membranes must be raised above the level of any possible flooding caused by the blockage of roof drainage.

13.9 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 bituFLAME® Roof and Deck Membranes.

14.2 The first 25 mm of rainfall from a newly installed bituFLAME® Roof and Deck Membranes 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 bituFLAME® Roof and Deck Membranes roof.

14.3 Though bituFLAME® Roof and Deck Membranes 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 sterilization system. Sterilization 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 membranes must be completed by Trained and Approved Installers, approved by Waterproofing Systems NZ Ltd.

15.2 All design and building work must be carried out in accordance with the bituFLAME® Roof and Deck Membrane Technical Literature and this Appraisal by competent and experienced tradespersons conversant with membrane systems. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License class.

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 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.

16.3 The moisture content of the plywood and timber substructure must be a maximum of 20% and the plywood sheets 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.

16.4 Substrates must be primed with bituPRIME Primer and left to dry (4-5 hours) before the membrane is installed.

Membrane Installation

17.1 The membrane must be installed in accordance with the Technical Literature.

17.2 All roof, deck and wall junctions must have a 20 mm x 20 mm wooden fillet installed at the junction. Concrete substrate junctions must have a 20 mm x 20 mm cement mortar fillet installed. All external edges must be chamfered to a 5 mm radius to remove sharp edges.

17.3 The membrane must be unrolled without tension onto the prepared substrate and allowed to 'relax' for at least 30 minutes prior to installation.

17.4 The membrane is installed from the lowest point and each layer is installed across the roof fall allowing a 100 mm side overlap and a 150 mm end overlap. The cap sheet layer of a double layer system must be offset against the base sheet layer.

17.5 Where pedestals are used there must be a separation layer between the pedestals and the finished membrane system.

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 manufacturer's instructions.

Health and Safety

19.1 Safe use and handling procedures for bituFLAME® Roof and Deck Membranes are provided in the Technical Literature. The products must be used in conjunction with the relevant Material Safety Data Sheets for each membrane.

Basis of Appraisal

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

Tests

20.1 The following is a summary of the testing of bituFLAME® Roof and Deck Membranes undertaken by BRANZ, and testing by other organizations as listed that has been reviewed by BRANZ and found to be satisfactory:

- BRANZ – Cyclic joint movement to ASTM D5849-95, and nail pull-through and spot bonding peel to ascertain load resistances and tensile adhesion.
- Materials Science and Engineering Consultants, USA – breaking strength, ultimate elongation, load strain, water resistance, low temperature flexibility, water vapour transmission, dynamic impact, lap joint strength, strength after accelerated weathering and crack bridging capability to CGSB 37-GP-56M and various ASTM standards.
- Al Hoty-Stanger Ltd, Kingdom of Saudi Arabia - thickness, width, cold flexibility, low temperature, softening point, penetration, tear resistance, tensile strength, elongation, load strain, lap joint strength, heat resistance, static indentation, dynamic punching test, all to UEAtc methods; water absorption to ASTM D 570; compressibility; and resistance to hydrostatic pressure to DIN 1048.
- Bureau Veritas International – thickness, weight, flexibility, water absorption, permeability, elongation and shore hardness.
- Saudi Socotec – width, length, weight, thickness, resistance to heat, tensile strength, elongation, tear resistance, softening point, penetration, lap joint strength, cold pliability and puncture resistance all to UEAtc methods.

Other Investigations

21.1 A durability opinion has been provided by BRANZ technical experts.

21.2 Installation of the membranes has been assessed by BRANZ for practicability of installation and found to be satisfactory.

21.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

22.1 The manufacture of bituFLAME® Roof and Deck 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. BRANZ has taken note of product certification covering quality aspects associated with these products.

22.2 The quality of the supply of products to the New Zealand market is the responsibility of Waterproofing Systems NZ Ltd.

22.3 Quality on site is the responsibility of the Waterproofing Systems NZ Ltd approved installers.

22.4 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 Waterproofing Systems NZ Ltd and this Appraisal.

22.5 Building owners are responsible for the maintenance of the membrane systems in accordance with the instructions of Waterproofing Systems NZ Ltd and this Appraisal.

Sources of Information

- AS/NZS 1170: 2002 Structural design action - General principles
- AS/NZS 2269: 2012 Plywood – Structural.
- BRANZ Good Practice Guide – Membrane Roofing, October 2015.
- BRANZ Bulletin Number 585 Measuring Moisture in Timber and Concrete.
- NZS 3101: 2006 The design of concrete structures.
- 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.

BRANZ

In the opinion of BRANZ, bituFLAME® Roof and Deck 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 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

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18 December 2019