



BRANZ Appraised

Appraisal No. 685 [2016]

DE BOER DUO ROOF MEMBRANE SYSTEMS

Appraisal No. 685 [2016]

This Appraisal replaces
Appraisal No. 685 [2010].



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



de boer

De Boer Waterproofing Solutions nv

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Product

- 1.1 De Boer DuO Roof Membrane Systems are torch-on bitumen modified waterproofing membranes for roofs.

Scope

- 2.1 De Boer DuO Roof Membrane Systems have been appraised as roof 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 or suspended concrete slab; and,
 - situated in NZS 3604 Wind Zones, up to, and including Extra High.
- 2.2 De Boer DuO Roof Membrane Systems have also been appraised for use as roof 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 4kPa; and,
 - with the weathertightness design of junctions for each specific structure being the responsibility of the building designer.
- 2.3 Roofs waterproofed with De Boer DuO Roof Membrane Systems must be designed and constructed in accordance with the following limitations:
 - nominally flat or pitched roofs constructed to drain water to gutters and drainage outlets complying with the NZBC; and,
 - with no integral roof gardens.
- 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 Equus Industries Ltd Certified Applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, De Boer DuO Roof Membrane Systems, 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. De Boer DuO Roof Membrane Systems meet this requirement. See Paragraph 10.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. De Boer DuO Roof Membrane Systems meets these requirements. See Paragraphs 13.1 – 13.9.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. De Boer DuO Roof Membrane Systems meet 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. The membranes are an alternative to the membranes specified in NZBC Acceptable Solution E2/AS1, and an Alternative Solution subject to specific design for other buildings not covered within E2/AS1.

Technical Specification

4.1 Materials supplied by Equus Industries Ltd are as follows:

- **DeboPlast 2.5 mm T/F K180** - is a 2.5 mm thick, APP modified bitumen-based sheet waterproofing membrane with a mixture of talcum and sand on the upper surface and an ultra-thin Polyethylene foil on the under layer used as a base layer in multi-layer systems. It has a 180 g/m² polyester reinforcement and is supplied in 1 m x 10 m rolls.
- **DeboFlex 2.5 mm T/F K180** - is a 2.5 mm thick, SBS modified bitumen-based sheet waterproofing membrane with a mixture of talcum and sand on the upper surface and an ultra-thin Polyethylene foil on the under layer used as a base layer in multi-layer systems. It has a 180g/m² polyester reinforcement and is supplied in 1 m x 10 m rolls.
- **DeboPlast 2.5 mm T/F C175** - is a 2.5 mm thick, APP modified bitumen-based sheet waterproofing membrane with a mixture of talcum and sand on the upper surface and an ultra-thin Polyethylene foil on the under layer used as a base layer in multi-layer systems. It has a composite reinforcement of 175 g/m² polyester and glass and is supplied in 1 m x 10 m rolls.
- **DeboFlex 2.5 mm T/F C175** - is a 2.5 mm thick, SBS modified bitumen-based sheet waterproofing membrane with a mixture of talcum and sand on the upper surface and an ultra-thin Polyethylene foil on the under layer used as a base layer in multi-layer systems. It has a composite reinforcement of 175 g/m² polyester and glass and is supplied in 1 m x 10 m rolls.
- **DeboTack 2.5 mm T/F C175** - is a 2.5 mm thick, SBS modified bitumen-based sheet waterproofing membrane with a mixture of talcum and sand on the upper surface and a self-adhesive under layer used as a base layer in multi-layer systems. It has a composite reinforcement of 175 g/m² polyester and glass and is supplied in 1 m x 10 m rolls.
- **DuO HT 4 Slates/F C180** - is a nominal 4 mm thick TPO/SBS composite bitumen, torch applied sheet waterproofing membrane with a coloured slate granule upper surface finish and a polyethylene under finish used as a cap sheet in a multi-layer system. It has a composite reinforcement of polyester and glass of 180 g/m². It is supplied in 1 m x 8 m rolls.
- **DuO HT 4 Slates/F C180 Aero** - is a nominal 4 mm thick TPO/SBS composite bitumen, torch applied sheet waterproofing membrane with a coloured slate granule upper surface finish and an under layer of pure SBS strips with polyethylene foil finish to allow vapour distribution under the waterproofing, used as a cap sheet in a single-layer system. It has a composite reinforcement of polyester and glass of 180 g/m². It is supplied in 1 m x 8 m rolls.

- **DuO HT 4 Slates/F C180 Mecano** - is a nominal 4 mm thick TPO/SBS composite bitumen, sheet waterproofing membrane with a coloured slate granule upper surface finish and an under finish of polyethylene foil which is designed to be mechanically fastened to the roof, used as a cap sheet in a single-layer system or multi-layer system. It has a composite reinforcement of polyester and glass of 180 g/m². It is supplied in 1 m x 8 m rolls.
- **DuO 4 HT Slates/PP C180 No Flame** - is a nominal 4 mm thick TPO/SBS composite bitumen, sheet waterproofing membrane with a coloured slate granule upper surface finish and an under finish of polypropylene fleece which can be fully bonded without heat, used as a cap sheet in a multi-layer system. It has a composite reinforcement of polyester and glass of 180 g/m². It is supplied in 1 m x 8 m rolls.
- **DuO B&T 4 Gran/F C250** - is a nominal 4 mm TPO/SBS composite bitumen, torch applied sheet waterproofing membrane with a grey granule upper surface finish and an under finish of polyethylene foil. It has a composite reinforcement of polyester and glass of 250 g/m² to provide a higher reinforcement level for greater heat resistance, elongation and strength used as a cap sheet under hot applied asphalt mixes. It is supplied in 1 m x 8 m rolls.
- **DuO HT 4 Slates/ F C180 Landscape** - is a nominal 4 mm TPO/SBS composite bitumen, torch applied sheet waterproofing membrane with a coloured slate granule upper surface finish and an under finish of polyethylene foil. It has a composite reinforcement of polyester and glass of 180 g/m². It is root resistant according to EN13948 and applicable for green roofs. It is used as a cap sheet in multi-layer systems. It is supplied in 1 m x 8 m rolls.
- **DuO HT 4 Slates/ F C180 Firecare** - is a nominal 4 mm TPO/SBS composite bitumen, torch applied sheet waterproofing membrane with a coloured slate granule upper surface finish and an under finish of polyethylene foil. It has a composite reinforcement of polyester and glass of 180 g/m². It is designed for fire resistant applications and used a cap sheet in multi-layer systems. It is supplied in 1 m x 8 m rolls.
- **DuO Primer** - is a solvent-based, bituminous varnish used to prime dry and porous surfaces. It is supplied in 25 lt containers.
- **DuO Kit** - is a bituminous adhesive/sealant used for cold bonding and sealing when necessary. It is a black paste, supplied in 310 ml cartridges.
- **DuO Cold Glue** - is a bituminous cold adhesive for adhering DuO No Flame waterproofing membranes. It is supplied in 25 kg cans.

Handling and Storage

- 5.1 Handling and storage of all materials whether on or off site is under the control of the Equus Industries Ltd Certified Applicators. 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 De Boer DuO Roof Membrane Systems. 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 De Boer DuO Roof Membrane Systems are for use on roofs, 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. Equus Industries Ltd should be consulted as to the suitability of any existing substrates prior to using De Boer DuO Roof Membrane Systems.
- 7.2 De Boer DuO Roof Membrane Systems are normally applied as double layer systems, with a base layer and cap layer. There are a number of different options available, Equus Industries Ltd should be consulted for the best option depending on performance requirements.
- 7.3 The effective control of internal moisture must be considered at the design stage because of the impermeability of the membranes. Refer to BRANZ publication "Good Practice Guide - Membrane Roofing".

Structure

- 8.1 De Boer DuO Roof Membrane Systems fully bonded double layer systems are suitable for use in areas subject to maximum wind pressures of 4 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 De Boer DuO Roof Membrane Systems will have a durability of at least 15 years and an expected serviceable life of over 20 years, provided they are designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

Chemical Resistance

- 10.2 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 system, must be regularly [at least annually] checked for damage, rubbish or debris. Damage, such as small punctures and tears, must be repaired as recommended by Equus Industries 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 De Boer DuO Roof Membrane Systems 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 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, De Boer DuO Roof Membrane Systems 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 falls must be built into the substrate and not created with mortar screeds applied over the membrane.
- 13.4 The minimum fall to roofs is 1 in 30 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 gutter fall of 1:60 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 De Boer DuO Roof Membrane Systems 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 De Boer DuO Roof Membrane Systems.
- 14.2 The first 25 mm of rainfall from a newly installed De Boer DuO Roof Membrane Systems roof must be discarded before water collection starts. This is to remove residues which may have developed in the processes involved in the production of a De Boer DuO Roof Membrane Systems membrane roof.
- 14.3 Though De Boer DuO Roof Membrane Systems will not 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 and tested. 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 Equus Industries Ltd Certified Applicators.
- 15.2 Installation of substrates must be completed by tradespersons with an understanding of roof construction, in accordance with instructions given within the Equus Industries 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 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 All substrates must be primed with DuO Primer and left to dry before the membrane is installed.

Membrane Installation

- 17.1 The membranes must be installed in accordance with the Technical Literature.
- 17.2 All roof 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 is installed from the lowest point and each layer is installed across the roof fall allowing a 80 mm side overlap and a 100 mm end overlap. The cap sheet layer must be offset against the base sheet layer.

Note: These are minimum overlap widths. Refer to Manufacturer's Instructions for the specific overlap widths for the product being specified.

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.

Basis of Appraisal

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

Tests

- 19.1 The following is a summary of the testing and test reports on De Boer DuO Roof Membrane Systems:
- Physical properties included tensile strength, elongation, tear strength, dimensional stability.
 - Service performance testing included low temperature flexibility, heat resistance, static and dynamic indentation, fatigue cycling and peel resistance.
 - Testing by SGS for dimensional stability, tear resistance, tensile strength, elongation at break, low temperature flexibility, heat resistance and tensile shear at joints.
 - British Board of Agrément No. 98/3537.

The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 20.1 A durability opinion has been provided by BRANZ technical experts.
- 20.2 Installation of the membranes has been assessed by BRANZ for practicability of installation and found to be satisfactory.
- 20.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 21.1 The manufacture of the 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. The manufacturer of De Boer DuO Roof Membrane Systems has been assessed and registered as meeting the requirements of ISO 9001: 2008.
- 21.2 The quality of the supply of products to the New Zealand market is the responsibility of Equus Industries Ltd.
- 21.3 Quality on site is the responsibility of the Equus Industries Ltd Certified Applicators.
- 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 Equus Industries Ltd and this Appraisal.
- 21.5 Building owners are responsible for the maintenance of the membrane systems in accordance with the instructions of Equus Industries Ltd and this Appraisal.

Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2269: 2012 Plywood – structural.
- BRANZ Good Practice Guide – Membrane Roofing, reprint October 2015.
- 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 6, 14 February 2014].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



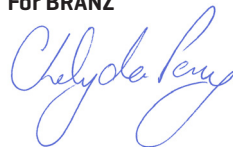
In the opinion of BRANZ, **De Boer Duo Membrane Systems** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **De Boer Waterproofing Solutions nv**, 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. **De Boer Waterproofing Solutions nv**:
 - 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 **De Boer Waterproofing Solutions nv**.
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 **De Boer Waterproofing Solutions nv** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

27 May 2016