



BRANZ Appraised
Appraisal No. 1056 [2019]

PERMAPHALT MASTIC ASPHALT GREEN ROOF WATERPROOFING SYSTEM

Appraisal No. 1056 [2019]

Amended 06 August 2021



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 The Permaphalt Mastic Asphalt Green Roof Waterproofing System is a polymer-modified, bitumen mastic asphalt green roof for concrete roof structures incorporating Permaphalt Mastic Asphalt.

Scope

- 2.1 The Permaphalt Mastic Asphalt Green Roof Waterproofing System has been appraised for use as a green roof on buildings within the following scope:
- with substrates of suspended reinforced concrete; and,
 - with each structure the subject of specific structural engineering and weathertightness design.
- 2.2 The design and construction of the substrate and movement and control joints is the responsibility of the building designer and building contractor.
- 2.3 The design and installation of the drainage board, filter sheet and ballast is the responsibility of the green roof contractor and is outside the scope of the Appraisal.
- 2.4 The Permaphalt Mastic Asphalt Green Roof Waterproofing System must be installed by Neuchatel Limited approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, the Permaphalt Mastic Asphalt Green Roof Waterproofing System, 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 B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. The Permaphalt Mastic Asphalt Green Roof Waterproofing System meets the requirements for loads arising from self-weight, imposed gravity loads arising from use, water and other liquids, wind and differential movement [B1.3.3 (a), (b), (e), (h) and (m)]. See Paragraphs 8.1 and 8.2.

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. The Permaphalt Mastic Asphalt Green Roof Waterproofing System meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. The Permaphalt Mastic Asphalt Green Roof Waterproofing System meet these requirements. See Paragraphs 12.1–12.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Permaphalt Mastic Asphalt Green Roof Waterproofing System meets this requirement.

Technical Specification

- 4.1 Materials supplied by Neuchatel Limited are as follows:
- **Permaphalt polymer modified mastic asphalt** to NZS/BS 6925. Manufactured to BS EN ISO 9001 and tested to BS 476.3. Laid in two or three layers with thicknesses of 10 mm each.
 - **Coarse aggregate** – for paving grades to be crushed rock to BS 1447. Coarse aggregate for grade IV flooring to be clean igneous, calcareous rock or siliceous material to NZS/BS 6925.
 - **Pre-coated chippings** – for paving grade mastic asphalt to BS 1447.
 - **Black sheathing felt** – used as a separation layer between the substrate and mastic asphalt.
 - **Viapol 3mm plain** – used as a vapour barrier.
 - **IKO enertherm ALU** – used as thermal insulation when required.
 - **Ausdrain modular horizontal drainage** – used as part of the drainage system.
 - **Syntex geotextile non-woven** – used as a geotextile membrane over the drainage material.
 - **Bituminous primer** – used to provide adhesion of vapour control barrier.

Handling and Storage

- 5.1 Handling and storage of all materials, whether on-site or off-site, is under the control of the Neuchatel Limited approved applicators. Cool and 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 Permaphalt Mastic Asphalt Green Roof Waterproofing System. 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 The Permaphalt Mastic Asphalt Green Roof Waterproofing System is a means for building green roofs, which are defined as roofs onto which vegetation is intentionally grown. It is comprised of a vapour layer, waterproofing membrane, drainage material, geotextile fabric and growing media. The system is a fully bonded and trowel-applied in three layers of 10 mm each for horizontal areas and two layers of 10 mm thick for vertical areas. The Permaphalt Mastic Asphalt Green Roof Waterproofing System is impervious to water and will resist penetration by roots.
- 7.2 The structural concrete roofs to which the system is to be applied must be designed to transmit the dead and imposed loads experienced in service. Dead loads, imposed loads and wind load specifications are calculated in accordance with AS/NZS 1170. The growing medium requirements should be calculated in accordance with the guidance given by Neuchatel Limited.
- 7.3 The drainage system must be correctly designed and provision made for access for maintenance purposes. Dead loads for green roofs can increase if the drains become partially or completely blocked, causing waterlogging of the drainage layer. Gravel guards must therefore be used on rainwater outlets and be inspected annually.
- 7.4 The weathertightness design of each specific structure, including penetration and termination detailing, is the subject of specific design by, or under the supervision of, a Licensed Building Practitioner with the relevant License Class.
- 7.5 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membranes.

Structure

Concrete

- 8.1 Concrete substrates must be subject to specific engineering design meeting the requirements of NZS 3101 and the NZBC. The designer must take into account possible loads arising from the media used and flooding.

Resistance to Wind Uplift

- 8.2 In areas of wind exposure greater than NZS 3604 Wind Zone Extra High, the advice of Neuchatel Limited should be sought. Growing medium used in green roofs should be of a type that will not be removed or become localised by wind scour experienced on site. It must be recognised that the type of plants used in a green roof can significantly affect the expected wind loads experienced in service.

Resistance to Foot Traffic

- 8.3 Once a green roof is installed it can be regarded as a suitable protection for the membrane in use. However, it must be recognised that the membrane is taken up beyond the level of the growing media [at least 150 mm] and is therefore vulnerable to damage in those areas.

Resistance to Penetrations of Roots

- 8.4 Results of tests on the membranes indicate that they are resistant to root penetration and can be used in a roof waterproofing system for green roofs.

Durability

Serviceable Life

- 9.1 The Permaphalt Mastic Asphalt Green Roof Waterproofing System is expected to have a serviceable life of at least 15 years, provided it is designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

Chemical Resistance

- 9.2 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

- 10.1 Maintenance requirements for the membrane are provided by Neuchatel Limited.
- 10.2 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.
- 10.3 The green roof system must be regularly [at least annually] checked to ensure that unwanted vegetation and other debris is cleared from the roof and drainage outlets. Damage from wind scour must be repaired.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to the Permaphalt Mastic Asphalt Green Roof Waterproofing System 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

- 12.1 Roofs must be designed and constructed to shed precipitated moisture to meet the requirements of NZBC Performance Clause E2.3.1.
- 12.2 The Permaphalt Mastic Asphalt Green Roof Waterproofing System membranes are impervious to water. The membrane will adequately resist the passage of moisture into the building and enable the roof to meet the requirements of NZBC Performance Clause E2.3.2. Compliance with the requirements of NZBC Performance Clause E2.3.2 for penetration and termination detailing, is the responsibility of the building designer.

- 12.3 Roof falls must be built into the concrete substrate. The minimum fall to roofs is 1 in 30 and gutters is 1 in 100. All falls must slope to an outlet. Inadequate falls will allow moisture to collect.
- 12.4 Allowance for 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.
- 12.5 The Permaphalt Mastic Asphalt Green Roof Waterproofing System is impermeable, therefore a means of dissipating construction moisture must be provided in the building design to meet compliance with NZBC Performance Clause E2.3.6.
- 12.6 Drainage flanges must be used for any outlet and must be fitted with a gravel guard to reduce potential sources of blockages. An overflow must be provided where the roof does not drain to an external gutter.
- 12.7 Penetrations and upstands must be raised above the level of any possible flooding caused by the blockage of roof drainage.

Internal Moisture

- 13.1 In Climate Zone 3, as defined by the definitions, NZBC H1/VM1 and AS1, a vapour control membrane must be installed. Where required, Viapol 3 mm membrane must be installed over the structural deck prior to installing the insulation.

Energy Efficiency

- 14.1 The thermal resistance [R-value] of the insulation boards has not been assessed and is outside the scope of the Appraisal. The building designer is responsible for carrying out a thermal design for each specific building.

Installation Information

Installation Skill Level Requirement

- 15.1 Installation of the Permaphalt Mastic Asphalt Green Roof Waterproofing System must be completed by trained applicators, approved by Neuchatel Limited.
- 15.2 Installation of the concrete substrate must be completed by, or under the guidance of, a Licensed Building Practitioner with the relevant License Class, in accordance with the instructions of the building designer, the Technical Literature and this Appraisal.

Preparation of Concrete Substrate

- 16.1 The concrete substrates must be surface 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 provide an even and uniform surface.
- 16.2 The relative humidity of concrete substrates must be 75% or less before application of the Permaphalt Mastic Asphalt Green Roof Waterproofing System. The concrete can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 585.

System Installation

- 17.1 The installation of the Permaphalt Mastic Asphalt Green Roof Waterproofing System is complex and limited to trained applicators only. The Neuchatel Limited Applicator's Manual must be referred to in all instances.

Inspections

18.1 Critical areas of inspection for green roof systems are:

- Construction of substrates, including crack control and installation of movement control joints.
- Moisture content of the substrate prior to the application of the system.
- Acceptance of the substrate by the membrane installer prior to application of the system.
- Installation of the system including vapour barrier, geotextile cloth, insulation and membrane to Neuchatel Limited instructions.
- Installation of plastic drainage cell, filter cloth and the ballast [growing media].

Health and Safety

19.1 Safe use and handling procedures for the Permaphalt Mastic Asphalt Green Roof Waterproofing System are provided in the Technical Literature.

Basis of Appraisal

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

Tests

20.1 The following testing of Permaphalt Mastic Asphalt Green Roof Waterproofing System has been undertaken by various organisations:

- Tensile strength, elongation, dimensional stability, water vapour permeability, ring and ball softening point, hardness retention, resistance to water pressure, flow resistance, static indentation and hard body impact.

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

Other Investigations

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

21.2 Installation of the system has been assessed by BRANZ for practicability 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 Permaphalt Mastic Asphalt Green Roof Waterproofing System components have 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 an overseas approval covering quality aspects associated with the system.

22.2 The quality of supply of the products to the market is the responsibility of Neuchatel Limited.

22.3 Quality on-site is the responsibility of the Neuchatel Limited approved applicators.

22.4 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of the substrate.

Sources of Information

- AS/NZS 1170:2002 Structural design actions - General principles.
- BRANZ Bulletin No. 585. Measuring Moisture in Timber and Concrete, June 2015.
- NZS 3101:2006 Concrete Structures Standard.
- The GRO Green Roof Code - Green Roof Code of Best Practice for the UK 2011.
- 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.




In the opinion of BRANZ, **Permaphalt Mastic Asphalt Green Roof Waterproofing System** 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 **Neuchatel 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. **Neuchatel 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 **Neuchatel 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 **Neuchatel Limited** or any third party.

For BRANZ



Chelydra Percy

Chief Executive

Date of Issue:

14 March 2019