



BRANZ Appraised

Appraisal No. 902 [2021]

SARNAFIL GREEN ROOF WATERPROOFING SYSTEM

Appraisal No. 902 [2021]

This Appraisal replaces BRANZ
Appraisal No. 902 [2016]



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



BUILDING TRUST

Sika [NZ] Ltd

PO Box 19 192
Avondale
Auckland 1746
Tel: 0800 SIKA NZ
Fax: 0800 SIKA FAX
Web: www.sika.co.nz



BRANZ

BRANZ

1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

- 1.1 The Sarnafil Green Roof Waterproofing System is a ballasted green roof for concrete roof structures incorporating loose laid Sarnafil membranes and insulation board.

Scope

- 2.1 The Sarnafil 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 Sarnafil Green Roof Waterproofing System must be installed by Sika [NZ] Ltd trained and approved applicators.

Building Regulations

New Zealand Building Code [NZBC]

- 3.1 In the opinion of BRANZ, the Sarnafil 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 Sarnafil 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 Sarnafil Green Roof Waterproofing System meets these requirements. See Paragraphs 11.1 and 11.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. The Sarnafil Green Roof Waterproofing System meet these requirements. See Paragraphs 14.1–14.8.

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



Technical Specification

- 4.1 The Sarnafil waterproofing membranes are manufactured from extrusion coating plasticised PVC and FPO into sheets which are then reinforced with a scrim.
- 4.2 Membranes and accessories supplied by Sika [NZ] Ltd are as follows:
- **Sarnafil® G410** – a multi-layer roof waterproofing membrane based on plasticised PVC. It has a lacquer coating on the upper face to provide an easy clean surface where the surface of the membrane is exposed. It is supplied as a grey membrane, 2 mm thick, in rolls 15 m long x 2 m wide.
 - **Sarnavap** – a self-adhesive, SBS modified membrane used as a vapour/air barrier. It is 0.8 mm thick and is supplied in rolls 1.14 m wide x 40.8 m long.
 - **Sika® SarnaTherm® - 11** – a rigid, moulded polystyrene insulation board, coloured white. It is supplied in 1 m lengths x 1 m wide and is available in various thicknesses.
 - **Sika® SarnaTherm® - 21** – a rigid, extruded polystyrene insulation board, coloured blue. It is supplied in 2.4 m lengths x 600 mm wide and is available in various thicknesses.
 - **Sika® SarnaTherm® - 31** – a rigid, PIR thermal insulation board faced on both sides with a glass tissue. It is supplied in either 1.2 m lengths x 600 mm wide or 2.27 m lengths x 1.2 m wide and is available in various thicknesses.
 - **Fasteners [Fastener 6.0 Series]** – carbon steel-based fasteners used together with washers to secure the membrane to the substrate. They are available in a range of lengths depending on application.
 - **Sarnabar** – a coated steel-based bar used at the perimeter of the roof or detail joints for reinforcing the fixing of the membrane. The bars are 1.5 mm thick, 30 mm wide x 2.25 m long.
 - **Sarnacol 2170 Adhesive** – a nitrile rubber-based contact adhesive for adhering membrane to membrane and membrane to concrete, plaster, steel or plywood. It is supplied as a red liquid in 20 kg pails.
 - **S-Felt 300 g/m²** – a white geotextile-based material used as a separation layer between the membrane and non-compatible material. It is coloured white and is supplied in rolls 2 m wide.
 - **S-PE Film** – a 0.3 mm polyethylene based film. It is white and supplied in rolls 4 m wide by 42.5 m long.
 - **S-PE Film Tape** – a 2 mm thick, one component butyl-latex waterproofing adhesive tape. It is coloured black and is supplied in rolls 100 mm wide x 20 m long.
 - **S-Gravelstop Profile** – a stainless steel perforated profile used to contain ballast or growing media at the roof edge.
 - **S-Inspection Chamber with Ext.** – an aluminium chamber with extensions, used when the roof drain needs to be accessible.

Handling and Storage

- 5.1 Handling and storage of all materials whether on-site or off-site is under the control of the Sika [NZ] Ltd trained and 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 Sarnafil 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 Sarnafil 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, insulation material, separation layer, waterproofing membrane, drainage material, geotextile fabric and growing media. The system is loose laid with heat welded joint on the flat surfaces with mechanical fastening around the perimeter. The upstands are fully adhered and then heat welded over the perimeter fastenings. The Sarnafil 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 ballast (growing medium) requirements should be calculated in accordance with the guidance given by Sika [NZ] Ltd.
- 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 ballasted loose-laid green roof systems, the precise ballast (growing media) requirements must be calculated. In areas of wind exposure greater than NZS 3604 Wind Zone Extra High, the advice of Sika [NZ] Ltd should be sought. The membrane must always be ballasted to prevent wind uplift with a minimum ballast weight of 80 kg/m² (dry). The required ballast weight will vary depending on the wind exposure and specific design requirements. 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

- 9.1 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

- 10.1 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

- 11.1 The Sarnafil 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

- 11.2 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

- 12.1 Maintenance requirements for the membrane are provided by Sika [NZ] Ltd.
- 12.2 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.
- 12.3 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

- 13.1 Separation or protection must be provided to the Sarnafil 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

- 14.1 Roofs must be designed and constructed to shed precipitated moisture to meet the requirements of NZBC Performance Clause E2.3.1.
- 14.2 The Sarnafil Green Roof Waterproofing System membranes are impervious to water. The membranes, including joints when completely sealed, 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.
- 14.3 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.
- 14.4 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.
- 14.5 The Sarnafil 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.
- 14.6 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.
- 14.7 Penetrations and upstands must be raised above the level of any possible flooding caused by the blockage of roof drainage.

Internal Moisture

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

Energy Efficiency

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

Installation Information

Installation Skill Level Requirement

- 17.1 All design and building work must be carried out in accordance with the Sarnafil Green Roof Waterproofing System Technical Literature and this Appraisal. Installation of the Sarnafil Green Roof Waterproofing System must be completed by Sika [NZ] Ltd trained and approved applicators.
- 17.2 Installation of the concrete substrate must be completed by, or under the guidance of, a Licensed Building Practitioner with the relevant Licence Class, in accordance with the instructions of the building designer, the Technical Literature and this Appraisal.

Preparation of Concrete Substrate

- 18.1 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.
- 18.2 The relative humidity of concrete substrates must be 75% or less before application of the Sarnafil 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

- 19.1 The installation of the Sarnafil Green Roof Waterproofing System is complex and limited to trained and approved applicators only. The Sika [NZ] Ltd Applicator's Manual must be referred to in all instances.

Inspections

- 20.1 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 material and membrane to Sika [NZ] Ltd instructions.
 - Installation of plastic drainage cell, filter cloth and the ballast [growing media].

Health and Safety

- 21.1 Safe use and handling procedures for the Sarnafil 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

- 22.1 Testing has been carried out on the membrane for tensile strength, elongation, shrinkage, flexibility at low temperature, puncture resistance, watertightness, joint strength under shear, heat aging resistance, chemical resistance and artificial weathering followed by tensile strength, elongation, low temperature flexibility retention and root penetration resistance. Results and test methods have been reviewed by BRANZ and found to be satisfactory.



Other Investigations

- 23.1 A durability opinion has been provided by BRANZ technical experts.
- 23.2 Installation of the system has been assessed by BRANZ for practicability and found to be satisfactory.
- 23.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 24.1 The manufacture of Sarnafil Green Roof Waterproofing System components 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 an overseas approval covering quality aspects associated with the system.
- 24.2 The quality of supply of the products to the market is the responsibility of Sika [NZ] Ltd.
- 24.3 Quality on-site is the responsibility of the Sika [NZ] Ltd approved applicators.
- 24.4 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.



BRANZ Appraised
Appraisal No. 902 [2021]

BRANZ Appraisal
Appraisal No. 902 [2021]
16 April 2021

SARNAFIL GREEN ROOF
WATERPROOFING SYSTEM



In the opinion of BRANZ, **Sarnafil 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 **Sika [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. **Sika [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 **Sika [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 **Sika [NZ] Ltd** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

16 April 2021