

# Viking Roof Garden System

Version: 1.1

## **Introduction:**

This document is intended as an initial reference for those embarking on a Viking Roofspec Roof Garden design. It addresses the key components and considerations for the successful implementation of a Roof Garden. The full specification is available via Masterspec where Viking Roofspec staff can assist with the writing and creation of a custom project specification.

## **1.01 ROOF GARDEN DESCRIPTION**

The Viking Roof Garden incorporates either Viking Enviroclad TPO membrane or Viking Torch-on Anti-root membrane system - on top of which one of three types of roof garden assemblies is installed. (An Electronic Leak Detection system installed under the membrane is strongly recommended).

## **1.02 ROOF GARDEN DEFINITIONS**

### **A. Shallow (Ultra-Extensive) Roof Garden System**

Shallow Roof Garden System (growth media depth min. 100mm) is ideally suited for areas that will receive little maintenance. Recommended shallow media plants include sedums, and some herbs. Please note: This depth is too shallow for grasses. The anticipated weight above the membrane assembly is generally around 35kg per square metre, per 25mm of system depth, in a saturated state. i.e.: 100mm depth medium saturated =  $35\text{kg} \times 4 = 140\text{kg} / \text{m}^2$  \*

### **B. Medium Depth (Extensive) Roof Garden System**

Medium Depth Roof Garden System (growth media depth of 100mm to 150mm) includes grasses plants such as sedums, herbs, grasses and other vegetation, which can grow in this depth of media. Un-irrigated systems can be provided without difficulty; however, drip, mist or spray irrigation systems may be required (very important for grasses) to support more diverse plant types or for installations in semi-arid climates. The anticipated weight above the membrane assembly is less than 240kg per square metre. \*

### **C. Deep (Intensive) Roof Garden System**

Deep Roof Gardens typically incorporate a planting system requiring greater growth media depth (exceeding 150mm) that requires regular maintenance, such as watering, fertilizing and mowing/weeding. A variety of plants are available including turf grass, annual or perennial flowers, shrubs and even small trees. This system typically requires a structural concrete roof deck to support the larger dead load. An irrigation system may be utilized in these assemblies.

The anticipated weight above the membrane assembly is generally greater than 240kg per square metre. \*

(\*See 3.02 for notes re Roof Deck Criteria)

## **1.03 DESIGN GUIDELINES**

To facilitate drainage, a minimum roof slope of 1.5 degrees (preferably 2.0) must be provided at the waterproofing membrane level. (Maximum slope = 30 degrees - which would require erosion control).

## **1.04 QUALITY ASSURANCE**

A. This Roof Garden System must be installed by a Viking Approved Applicator in compliance with architectural drawings as approved by Viking Roofspec. There must be no deviations made from these specifications or the approved drawings without PRIOR approval of Viking Roofspec.

B. A pre-installation meeting should be coordinated by the specifier and attended by the roofing applicator; Viking Roofspec representative; electronic leak detection expert; and other trades working on the roof system - before and after membrane installation. The purpose of this meeting is to discuss the necessity of ensuring proper membrane protection during all phases of installation and to review other applicable requirements or unusual field conditions.

C. Upon request by the Approved Applicator, an inspection will be conducted by a representative of Viking Roofspec to ascertain that the membrane roofing system has been installed according to Viking Roofspec's specifications and details. This inspection shall be coordinated prior to installing the "above membrane roof garden components" so access to the membrane is not impaired.

**1.05 SUBMITTALS**

For all projects, prior to project inspection by Viking Roofspec, a final shop drawing must be approved by Viking Roofspec's technical department.

**1.06 WARRANTY**

A. A 20-year Product Warranty is available for the complete system installed by an Approved Applicator to these specifications. The membrane system is defined as membrane, drainage board, flashings, adhesives, primers, sealants and other Viking branded products utilized in this installation. For a complete description of these products, refer to the "Products Section" or the applicable "Attachment" in the specifications.

B. *The formation or presence of mould or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Viking Roofspec who shall not be responsible for any claims, repairs, restoration or damages relating to the presence of any irritants, contaminants, vapours, fumes, moulds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.*

**1.07 JOB CONDITIONS**

Material Safety Data Sheets (MSDS) must be on location at all times during transportation, storage, and application of materials. The applicator shall follow all safety regulation as recommended by OSH and other agencies having jurisdiction.

Coordination between various trades is essential to avoid unnecessary rooftop traffic over sections of the roof and to prevent damage to the membrane. Heavily travelled areas must be protected by placing temporary protection courses to prevent damage to the membrane.

**1.08 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Deliver materials to the job site in the original, unopened containers labelled with the manufacturer's name, brand name and installation instructions.

B. Job site storage temperatures exceeding 32° C may affect shelf life of curable materials (i.e., sealants, cleaners, primers, adhesives).

C. When liquid adhesives, primers and sealants are exposed to lower temperatures, restore to a minimum of 7° C before use. Do not store containers with opened lids due to loss of solvent that will occur from flash off.

D. If using Viking Torch-on membranes, store in the shade and stack upright (on end) at all times.

E. Insulation. If a Warm Roof is specified to go below the Roof Garden, polyiso panels must be stored so they are kept dry and are protected from the elements. Store on a skid and completely cover with a breathable material such as tarp or canvas. It should also be weighted to prevent possible wind damage.

F. Growth Media should be stored under cover whenever possible to avoid direct sunlight exposure. Care should be taken not to damage the packaging to avoid leakage when hoisted to the rooftop.

G. Roof Garden Plants should be planted quickly after delivery to the jobsite. Sedum cuttings should be used within 12 hours of arrival.

**2.01 GENERAL**

The components of this roofing system are to be products of Viking Roofspec. The installation, performance or integrity of products supplied by others is not the responsibility of Viking Roofspec and is expressly disclaimed by the Warranty.

**2.02 MEMBRANE**

(i) Torch-on Membrane Option:

Viking Solvent-based bitumen primer (on top of Polyiso)– Viking Code SES299

Viking Termostar self-adhered base sheet (first layer) – Viking Code SEM300

Viking General Garden FLL Anti-root) (second layer) – Viking Code SEM630

(ii) Enviroclad Membrane Option:

Viking Enviroclad 1.5mm Grey TPO (Viking code STP510, or STP513)

Root Barrier 3.6m wide Polypropylene (Viking Code SRG002)

**2.04 ROOF GARDEN COMPONENTS**

A. Drainage Board system – Viking Code SRG001, consists of a high impact plastic core with “cups” and high-flow overflow drains. A non-woven 100% post-consumer recycled polyester combination filter fabric and green moisture retention mat is bonded to the retention side of the moulded core to prevent passage of particles into the water reservoirs. Designed to filter and retain water in all Roof Gardens while allowing excess water to quickly reach the drainage system. Drainage composite is 30mm thick and holds up to 86mm of rainfall per square metre. (Packaged in 1.2m x 15.2m rolls weighing 32kg – supplied cut-to-length)

B. Growth Media and Plants - Growing medium - Please note normal topsoil is inappropriate for a roof garden system which requires a light, fast draining medium with high pumice content. Generally, a soil layer of 10-20 cm thickness is sufficient for planting various foliage and flowering plants. A good soil mixture for roof gardening consists of a 2:1:1 split of pumice perlite, topsoil and FYM (farmyard manure) or compost. Other components could include digested fibre, expanded clay or shale, or coir.

Plants - It is necessary to choose drought resilient plants with shallow root system which will not penetrate the roof floor in long run such as grasses, sedums and aloes. At the same time, it is also advisable to grow such plants that flower at various periods of year and are very easily be maintained at roof top. Some recommended plants that thrive on Roof Garden include:

Foliage plants: - Asparagus, Coleus, Croton, Diffenbachia, Dracena, Paperomias, Philodendron rubber plant, etc.

Flowering plants: Seasonal flowers like Anthurhium, Asters, Balsam, Calendula, Celosia, Cosmos, Daisy, Dianthus, Gaillardia, Marigold Nasturtium, Pansies, Phlox, Verbena, Zeinia, etc., and perennial flowers like Carnation,

Chrysanthemum, Dahlia, Rose, Tuberose, etc. Fruits: - Gooseberry, Strawberry, Peach, Pear, Pineapple Pomegranate, etc Cactii and succulents: - Agave, Aloe, Kalanchoe, Opuntia, Cehpalocereus, Notocactus Nyctocereus, etc. Vegetables like Brinjal, Broccoli, Chillies, Lettuce, Tomato, etc

Caution: Do not use plants with aggressive root systems such as Flaxes and Bamboos.

C. Aluminium Roof Garden Edge – a 2mm thick extruded aluminium edge used to separate roof garden assemblies from adjacent walkways or perimeter stone ballast. The edging comes in 3.0m lengths and 100mm high with a 76mm flange or 200mm high with a 152mm flange.

F. Aluminium Roof Garden Drain Box – extruded aluminium drain box that is 300mm x 300mm with a welded 112mm flange to keep the drain areas clear of stone ballast or growth media. The drain box is available in 100mm or 200mm heights. Drainage holes are pre-punched around the sides. Access to the drain is provided by a removable lid.

**3.01 ROOF DECK CRITERIA**

Proper decking shall be provided by the building owner. The building owner or its designated representative must ensure that the building structure is investigated by a registered structural engineer to assure its ability to withstand the total weight of the specified roofing system, as well as construction loads and live loads, in accordance with all applicable codes. The specifier must also designate the maximum allowable weight and location for material loading and storage on the roof.

Defects in the roof deck must be reported and documented to the specifier, general contractor and building owner for assessment. The Approved Applicator shall not proceed unless the defects are corrected.

**3.03 SUBSTRATE REQUIREMENTS**

The substrate must be dry, relatively smooth and free of protrusions, debris, sharp edges or foreign materials and must be free of accumulated water, ice and snow. Cracks or voids in the substrate greater than (6 mm) must be filled with a suitable material such as Holdfast Gorilla Grip.

**3.04 WATERPROOFING INSTALLATION**

Before beginning installation, refer to the applicable Material Safety Data Sheets, OSH safety requirements, and Technical / Product Data Bulletins for cautions and warnings.

A. ELD – Electronic leak detection installation on the insulation surface.

B. (i) Torch-on Membrane Installation option - Follow Viking Roofspec's two-layer torch-on specifications (including surface preparation procedures) and membrane positioning,

(ii) Enviroclad Membrane installation option - - Follow Viking Roofspec's Enviroclad specifications (including surface preparation procedures) and membrane positioning,

C. Aluminium components – With Viking Enviroclad TPO these must be positioned and secured around all drains with Viking Lap Tape SMT076V before the drainage board is installed.

- With Viking Torch on, the components such as the edging may be mechanically fastened through the base sheet, followed by Torch on Anti-root being torch applied and sealed directly to the edging flange. Refer to Viking Roof Garden Torch on detail (RG08) for additional information.

D. Root Barrier (Installed on top of Enviroclad membrane option) – This weldable polypropylene sheet is loose-laid on the waterproofing layer and dressed up the parapets and then splice-taped around the tops of the parapets. All seams are to be heat welded. Where the root barrier meets the already-installed aluminium components, it is to be splice taped to the membrane surface and then overlay taped using SET153.

E. G4 Drainage board – cover the entire roof with drainage board – (Position additional drainage composite rolls next to each other with green moisture retention mat butted against the long side. Once in place, flip 150mm retention mat flap over the first drainage composite. For runs of drainage board exceeding 15m in length, peel back both fabrics approximately 76mm on the adjacent ends of the rolls and insert two rows of the “cups” into the cups of the abutting roll. This locks the rolls together and does not allow for passage of growth media directly onto the waterproofing membrane.

NB: Walls, curbs, skylights and all other penetrations through the membrane must be flashed in accordance with Viking Roofspec's published specifications/details for the applicable membrane specified. Refer to Roof Garden Typical Details.

Flashing heights shall be greater in height than the specified depth of the Roof Garden assembly

**Roof Drains**

Drains and Outlets are required to be Viking approved and compatible with the selected membrane system. As mentioned, these are to be covered with Aluminium Drain Box or a perforated drain box by others with removable lid (at the growth media surface height) for inspection purposes. 25-35mm nominal diameter rounded river washed gravel is applied around the drain box a minimum 450mm to promote drainage. Refer to Roof Garden Typical Details

### **3.05 ROOF GARDEN INSTALLATION**

#### Growth Media

- a. If possible, hoist growth media in sacks by crane to the roof area that is receiving the Roof Garden.
- b. Distribution of the growth media shall be directly over the roof from sacks that are lowered by crane 600mm to 1200mm above the drainage board composite.
- c. Slit the bottom of the sack with a knife or other cutting device to dispense the growth media directly over the drainage composite or into wheelbarrows for transportation to difficult access areas.

Caution: Location points for distribution of growth media must not overload the structural capacity of building.

Caution: Care must be taken when distribution of growth media is during windy conditions to limit potential scouring of media. (Coir matting can be commissioned in exceptionally windy areas). If growth media is not used on the day of arrival, product should be stored under a trap or other opaque cover to prevent direct exposure to sunlight and moisture.

#### 3. Plants

##### a. Sedum Cuttings

- i. Broadcast sedum cuttings by hand with a coverage rate of 0.5 kg per m<sup>2</sup> (Ensure the roof is more than 90% covered)
- ii. Immediately water the assembly until the system is saturated
- iii. Irrigate the Roof Garden for a minimum of 60 days following installation

#### 4. After installation of Roof Garden Components

Irrigate the Roof Garden with a lawn sprinkler, hand sprayer, or with a designed irrigation system until saturation to the point of runoff. The Viking Roof Garden System has been appraised for use as a roof garden on buildings with suspended reinforced concrete substrates and engineered plywood substrates subject to specific structural engineering and weathertightness design. It is important for the building designer and contractor to assume responsibility for the design and construction of the substrate, as well as the movement and control joints. The landscaping contractor is responsible for the design and installation of the growing media and plants, which falls outside the scope of this Appraisal. It is crucial that the Viking Roof Garden System is installed by Viking Roofspec approved applicators. Furthermore, Viking recommends the use of an electronic leak detection system installed under the membrane for added protection and future testing.

### **Conditions:**

The Viking Roof Garden System must comply with the relevant provisions of the New Zealand Building Code, including the following clauses:

1. **Drainage:** Proper drainage design and installation are critical for the performance of the Viking Roof Garden System. The system must be designed to ensure effective and efficient drainage of water from the roof garden, including appropriate slopes, outlets, and overflows.
2. **Load-Bearing Capacity:** The structural capacity of the roof and building must be assessed to ensure it can support the additional load imposed by the roof garden, including the weight of the growth media, plants, and any additional features such as walkways or seating areas.
3. **Waterproofing Compatibility:** The Viking Enviroclad membrane used in the system must be compatible with the specific waterproofing requirements of the project. It is essential to verify compatibility with any existing or planned waterproofing systems on the roof.
4. **Planting Selection:** The selection of plants for the roof garden should consider local climate conditions, maintenance requirements, and compatibility with the roof structure. Consultation with a horticulturist or landscape professional is recommended to ensure appropriate plant selection.
5. **Access and Maintenance:** Access to the roof garden for ongoing maintenance, including inspection, cleaning, and repair, should be considered during the design and construction phases. Adequate access points and pathways should be provided to facilitate routine maintenance tasks.

6. Fire Safety: Compliance with fire safety regulations is crucial for roof gardens. Consideration should be given to fire prevention measures, including fire-resistant plant selections, firebreaks, and adequate fire suppression systems if required by the building code.

### **Compliance with the New Zealand Building Code**

- Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2, B1.3.4, B1.3.3 (a), (b), (e), (h), and (m).
- Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2.
- Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2.
- Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1.

### **Design, Construction, and Installation Instructions:**

The product specification and incorporation of Viking Enviroclad into the building design should be carried out by a qualified designer, architect, engineer, or building professional who has access to the technical specifications, installation details, and standards referenced in BRANZ Appraisal No.903. This appraisal outlines the design limitations within the scope of this Product Technical Statement (PTS) and Product Data Sheet (PDS).

### **Maintenance Requirements:**

Maintenance of roof gardens can be challenging but necessary. Regular inspections and clearance of outlets and overflow systems from debris build-up are essential for effective operation. Viking recommends twice-yearly inspections and cleanouts of outlets and overflows to ensure their proper functioning. The membrane roof system should also be inspected for damage, rubbish, and debris, particularly around drainage points. Any identified damage, such as small punctures and tears, should be repaired, and coatings reapplied as recommended by Viking Roofspec Ltd. It is crucial to exercise caution during membrane roof system inspections to prevent moisture ingress, and repairs should be promptly addressed. Drainage outlets must be maintained to ensure their effective operation.

### **Quality Assurance:**

Viking provides quality assurance documents that should be followed and signed off by installers and builders upon project completion. These documents can be obtained from Viking Managers or the Viking website.

- Branz Appraisal
- Viking Roof Garden PTS
- Viking Roof Garden PDS
- Viking Roof Garden Details
- Viking Substrate checklists

### **Warranty Information:**

The Viking Enviroclad comes with a 20-year product warranty backed by Viking. A Certificate of Workmanship is provided by Viking Approved Applicator companies. Please note that access to the membrane for inspection may not be feasible, and thus, the warranty may not include inspection of the membrane itself.

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