oculus

ENGINEERING JUDGEMENT REPORT

ABOUT

VIKING ECOSTAR TILE

AUTHOR: Eva Rowe
DATE: 25/09/2025
OCULUS REFERENCE: J250403

PREPARED FOR

VIKING ROOFSPEC

OCULUS
Architectural Engineering
515 Rosebank Road,
Avondale, Auckland, 1026

09 820 0364
info@oculusltd.co.nz
www.oculusltd.co.nz

Revision Control

Revision number	Date published	Reviewed by
1	25/09/2025	Robyn Ryan

Table of Contents

1 SUMMARY

Viking Roofspec has requested an engineering judgement to evaluate the following:

- Viking EcoStar Tile

For their suitability of use in relation to the following New Zealand Building Code (NZBC) clauses:

- B1 – Structure
- B2 – Durability
- E1 – Surface Water
- E2 – External Moisture
- F2 – Hazardous Materials

This report constitutes the compliance pathway of this cladding system with the NZBC and must be read in conjunction with the supporting documentation listed in Section 5.

Subject to project-specific design and installation per manufacturer recommendations, **Oculus Building Science and Facades Limited are satisfied on reasonable grounds that the Viking EcoStar Roofing Tile will meet the provisions of the New Zealand Building Code listed above**.

2 CONDITIONS OF THIS REPORT

The compliance potential set out in this report for the Viking EcoStar Tile system has been evaluated using compliance documentation relevant to the proposed components. This report and any building consent resulting does not guarantee the building will achieve compliance with the New Zealand Building Code; only that it can achieve compliance as designed. Assumptions and limitations of the compliance potential set out in this report are described in Section 6.

3 OVERVIEW

The Viking EcoStar Tiles are supplied locally by Viking Roofspec. Viking EcoStar Tiles are lightweight, high-performance roofing tiles made from durable recycled polymer materials, designed to replicate the appearance of natural slate or timber shakes. Suitable for residential and commercial applications, they are ideal for pitched roofs where a traditional slate look is desired without the weight and fragility of natural stone or where the look of a timber shake roof is desired with minimal maintenance.

4 PERFORMANCE REQUIREMENTS

The NZBC Clauses and applicable Performance Requirements included within this review's scope are listed in Table 1 below. Demonstration that a product can meet the Performance Requirements of the clause ensures that the Functional Requirement and the Objective of the clause will be met.

Table 1: NZBC Function Requirements and Applicable Performance Requirements

NZBC	Functional Requirement	Applicable Performance Requirements within the scope of review
B1 Structure	B1.2 *Buildings*, *building elements*, and *site work* shall withstand the combination of loads that they are likely to experience during *construction* or *alteration* and throughout their lives.	B1.3.2 and B 1.3.3 a), b), f), h), m)
B2 Durability	B2.2 *Building* materials, components, and *construction* methods shall be sufficiently durable to ensure that the *building*, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the *building*.	B2.3.1 a), b), c) and B2.3.2 a), b)
E1 Surface Water	E1.2 *Buildings* and *sitework* shall be constructed in a way that protects people and *other property* from the adverse effects of *surface water*.	E1.3.1 -E1.3.3
E2 External moisture	E2.2 *Buildings* must be constructed to provide *adequate* resistance to penetration by, and the accumulation of, moisture from the outside.	E2.3.1 – E2.3.7
F2 Hazardous Materials	F2.2 *Building* materials which are potentially *hazardous*, shall be used in ways that avoid undue risk to people.	F2.3.1

A note on E3 – Internal Moisture

As the roofing membrane functions as a vapour barrier, it is the responsibility of the design team to ensure that appropriate measures are incorporated to prevent the accumulation of interior moisture within the attic space. The position of the insulation and vapour control layers should be considered in design to manage internal condensation.

5 COMPLIANCE PATHWAY

This section sets out:

- Summary of the Viking EcoStar Tiles' compliance with relevant clauses of the New Zealand Building Code, and
- Relevant documentation considered for this system.

Supporting Documents:

- BRANZ-891 Superstrand Nov 2023
- EcoStar Product Technical Statement April 2025
- EcoStar UL Evaluation report Updated 12-2019
- EcoStar Slate Technical Drawings 2016
- EcoStar Uplift Resistance Report - 2002
- EcoStar Fixing patterns Novemeber 2023
- EcoStar durability testing April 2011
- RoofRunner underlay technical information
- WinterGuard Technical Data Sheet
- EcoStar Care & Maintenance Guide
- GRACE Select Technical Data Sheet

Table 2: Method of Compliance with Applicable Performance Requirements

NZBC Clause	Method of Compliance with Applicable Performance Requirements

B1 Structure	NZBC B1 /AS1 - Product Certification and Alternative Solution:
	• Structural design actions to AS/NZS 1170 are applied in conjunction with appropriate material standards to establish compliance with Clause B1. The structure of the roof remains the responsibility of the structural engineer.
	• The specific structural design actions considered in this compliance report are:
	  o Wind
	  o Seismic
	  o Gravity/self-weight
	  o Snow loading
	• The EcoStar Roof Tile system is presented as an alternative solution that meets the structural performance requirements of NZBC Clause B1.
	• The tile system is mechanically fixed using stainless steel ring-shank nails (45mm for tiles and 64mm for ridging) into a compliant plywood or Superstrand substrate. Nail quantity and placement vary depending on wind zone, with two nails per tile for low and medium wind zones, and four nails per tile for high, very high, and extra high wind zones, in accordance with the manufacturer's fixing guidelines.
	• System weight ranges from 21–24.6 kg/m², depending on tile exposure (178 mm or 152 mm) and substrate type, with increased weight on lower-pitched

NZBC Clause	Method of Compliance with Applicable Performance Requirements
B1 Structure	roofs where a tighter exposure is used. These loads fall within the structural capacity of standard timber-framed roof construction as per NZS 3604. • Slate Tile exposure is limited to 178 mm for standard slopes, and 152 mm for lower slopes or higher wind zones, reducing uplift risk and distributing loads evenly across the structure. The fastener layout and substrate selection have been designed to resist self-weight, wind uplift, and impact in accordance with the loadings defined in NZS 3604 and AS/NZS 1170. Shake Tiles are to be installed per the manufacturer's documentation with an exposure of up to 203mm with consideration of wind loading. • Polymer tiles have a low coefficient of friction and when installed at the appropriate slope, are not deemed to accumulate snow. Therefore there are no structural implications from snow loading. Snow fall is a larger issue and in high snow loading areas, snow anchors are recommended as per manufacturer's technical data to prevent injury from falling snow loads. Limitations of use: • The system must be installed per the manufacturer instructions by trained personnel. • Substrates must meet structural requirements per structural engineer • Design wind zones must be confirmed to ensure the correct fixing pattern is applied.
B2 Durability	Alternative Solution and Comparison with Acceptable Solution B2/AS1 • The roofing system is presented as an alternative solution that satisfies the durability requirements of NZBC B2, in applications that meet the limitations listed below. • The roofing tiles are supported by a manufacturer-issued 50-year warranty, and are installed over compliant substrates such as treated plywood or Superstrand, which meet the requirements for wood-based materials outlined in NZBC B2/AS1 Table 1. • The roofing tiles are tested for long-term UV exposure and weather resistance, with proven performance under ASTM G155 testing to 10,000 hours, significantly exceeding both BRANZ (7000 hrs) and typical international benchmarks (4500 hrs), demonstrating resilience under New Zealand's high-UV environment. • Flashings are constructed from durable materials including EPDM rubber, powder-coated aluminium, Colorsteel, and copper, and are selected and detailed to comply with the minimum 15- or 50-year durability periods as applicable to their function and exposure, per NZBC B2/AS1 Figure 1.

NZBC Clause	Method of Compliance with Applicable Performance Requirements
B2 Durability	Limitations of use: • The polymer tiles and associated flashing materials must be used in accordance with manufacturer specifications and installed by appropriately trained personnel. • Substrate materials must comply with NZBC B2/AS1 requirements for structural timber and wood-based sheet products. • Durability performance is dependent on correct installation, including effective drainage, ventilation, and maintenance over the lifecycle of the building. • All fasteners, flashings, and metal components must be designed to be suitable for the corrosion risk exposure zone based on their selected locations per specific detailing.
E1 Surface Water	Alternative Solution • Roof tiles form an overlapping, water-shedding system that directs water to gutters and downpipes. The roof tiles, when installed at a minimum slope of 14 degrees as per the manufacturer's guidelines, are considered to comply with the functional requirements of NZBC Clause E1 - Surface Water. The system effectively sheds rainwater without ponding or ingress. The tiles are dimensionally stable and durable under wet conditions, preventing water ingress or degradation. Limitations of use: • Installation at ≥14° ensures sufficient slope for effective surface water runoff and compliance with E1.3.1 and E1.3.2.
E2 External Water	Alternative Solution and Comparison with Acceptable Solution E2/AS1 • The roofing system is presented as an alternative solution suitable for use in applications that meet the limitations listed below. • The system consists of polymer tiles mechanically fixed over an approved roofing underlay, installed on a plywood substrate, in accordance with the tile manufacturer's technical literature. • The roofing tiles are designed to operate as a water-shedding system. Each tile overlaps adjacent tiles, and the arrangement is such that all mechanical fixings are concealed beneath the overlapping tiles. This ensures that the primary water-shedding layer remains continuous and unperforated, consistent with the intent of E2/AS1 Clause 8.2 type III slate profile.

NZBC Clause	Method of Compliance with Applicable Performance Requirements
E2 External Water	• Water that lands on the surface is directed downward and outward via lapped joints, preventing ingress through the roof cladding. • The underlay provides a secondary line of defence to drain water off the roof and into the drainage network. • The system relies on correct pitch (minimum 14 degrees) and correct installation sequencing to ensure reliable performance under rainfall and wind conditions typical of NZBC-defined climate zones. • The Winterguard Underlay is a vapour barrier with a vapour resistance of ≥175 MN·s/g, and the RoofRunner Underlay is a water-resistant layer with a vapour resistance of ≥175 MN·s/g. While these values exceed the E2/AS1 Table 23 requirement of ≤7 MN·s/g, the roof design incorporates a water-shedding layer (roof tiles) and a weather barrier (membrane) installed at a minimum slope of 14 degrees. Under the Alternative Solution, this system is not designed to function as an E2/AS1 design. It is an impermeable membrane used to deflect any incidental water and does not allow for vapour diffusion. Any incidental moisture that reaches the membrane will be directed off the roof and into the gutter system. Therefore, we are satisfied on reasonable grounds that the membrane satisfies the functional requirement of NZBC Code Clause E2. • Before installing the roofing tiles, it's essential to apply a self-sealing underlayment to all rakes, valleys, ridges, hips, eaves, and any protrusions, in accordance with the technical specifications. This step ensures optimal protection and long-term performance. WinterGuard and GRACE Select are the options for these critical areas and should be installed following the supplier's documentation, to maintain its effectiveness. WinterGuard and GRACE Select are designed self-seal around the nails and fixings but won't self-repair tears or gashes in the membrane. It's important to patch any damage to the membrane as outlined in the supplier's instructions. Special attention should be given to ensure the membrane's integrity is preserved, especially in key areas. By following these guidelines, you'll help ensure a durable and reliable roofing system that performs well under various conditions. Limitations of use: • As the roofing membrane functions as a vapour barrier, it is the responsibility of the design team to ensure that appropriate measures are incorporated to prevent the accumulation of interior moisture within the attic space. • This roofing system is suitable for use on roof slopes of 14 degrees or greater, in accordance with manufacturer guidelines. • Penetrations, ridges, and valleys must be detailed using proprietary flashings and accessories as specified by the manufacturer to maintain continuity of water-shedding performance.

NZBC Clause	Method of Compliance with Applicable Performance Requirements
	• The system must be installed by trained personnel following the manufacturer's installation guide.
F1 Hazardous Materials F1 Hazardous Materials	Alternative solution The roofing tiles, manufactured from virgin and recycled polyolefin polymers materials, are considered to meet the functional requirements of NZBC Clause F1- Hazardous Building Materials. The tiles pose no known risk under normal installation and service conditions. This assessment is supported by: ▪ Recycled polymer tiles are non-toxic, inert, and do not emit hazardous fumes or fibres in situ. ▪ The material is UV stable and does not degrade into harmful substances when exposed to typical environmental conditions. See Durability Assessment ▪ The product is installed and handled externally and does not come into contact with internal occupied spaces or potable water systems. Collection of water run-off for a potable supply is not recommended.

6 ASSUMPTIONS AND LIMITATIONS

The compliance potential of each system set out in Section 5 of this report takes account of several assumptions regarding construction, quality assurance, and proper implementation of the design that would be expected. The following assumptions inform the compliance potential for this design:

- Products are designed, used and installed in accordance with the manufacturer's instructions and are subject to limitations outlined therein. These must be read and implemented in conjunction with a project's site-specific design. The manufacturer, or their representative, will periodically review installation and quality assurance procedures by the applicator as required to ensure the product is installed correctly and will be suitable for warranty coverage.
- This assessment is solely based on the information provided in the preceding sections and in the attached supporting appendices. It is important to note this assessment should not be regarded as a comprehensive evaluation of the systems' suitability for a specific project.
- For project-specific applications, a façade engineer, or other designated member of the design team, should review this report to assess whether additional information is needed to ensure the systems' appropriateness for the specific project.
- Refer to the material data sheets and manufacturer's instructions with respect to compatibility between materials. Where data is unavailable, the designer must seek technical advice from the manufacturer, or their representative, and perform compatibility and adhesion testing prior to full application.

7 COMPLIANCE STATEMENT

Subject to project-specific design and installation per manufacturer recommendations, Oculus Limited is satisfied on reasonable grounds that the Viking EcoStar Tiles meet the relevant provisions of the New Zealand Building Code.

Prepared by:

Eva Rowe
Building Enclosure Engineer
eva@obsf.co

Reviewed by:

Robyn Ryan
Senior Building Enclosure Engineer
robyn@obsf.co