



BRANZ Appraised

Appraisal No. 970 [2017]

VELUX SUN TUNNELS



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BRANZ Appraisals

Technical Assessments of products for building and construction.



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Product

- 1.1 Velux Sun Tunnels are for use on roofs of buildings to provide natural light into interior spaces within buildings. Velux offer four models of Sun Tunnels - TWF that features flexible internal ducting, TWR, TLR and TCR which use rigid ducting. All models are suitable for roof pitches between 15° and 60°, however the TCR model can be used at pitches between 0° and 60°. Some models can also be used to provide ventilation.

Scope

- 2.1 Velux Sun Tunnels [TWF, TWR and TLR] have been appraised for use on buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with respect to building height and maximum floor plan area; and,
 - with roof structures designed and constructed to meet the requirements of the NZBC; and,
 - with pitched roof cladding types and profiles specified in E2/AS1; and,
 - with a roof pitch between 15° and 60°; and,
 - situated in NZS 3604 Wind Zones, up to and including Extra High.
- 2.2 Velux Low-Pitch Sun Tunnels [TCR] have been appraised for use on buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with respect to building height and maximum floor plan area; and,
 - with roof structures designed and constructed to meet the requirements of the NZBC; and,
 - for use on flat or nominally flat roofs making use of membrane roof systems; and,
 - with a roof pitch between 0° and 60°; and,
 - situated in NZS 3604 Wind Zones, up to and including Extra High.
- 2.3 Velux Sun Tunnels must be installed in accordance with the Technical Literature supplied by Velux New Zealand Ltd.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Velux Sun Tunnels, if designed, used, installed, and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC.

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.3. Velux Sun Tunnels meet the requirements for loads arising from snow, wind and impact [i.e. B1.3.3 (g), (h) and (j)]. See Paragraphs 8.1 to 8.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years. Velux Sun Tunnels meet this requirement. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.1 and E2.3.2. Velux Sun Tunnels meet these requirements. See Paragraph 11.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. and F2.3.3 (a). Velux Sun Tunnels meet these requirements and will not present a health hazard to people and are unlikely to cause injury to people.

Clause G7 NATURAL LIGHT: Performance G7.3.1 and G7.3.2. Velux Sun Tunnels will contribute to meeting these requirements. See Paragraph 14.1.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 and H1.3.2E. Velux Sun Tunnels will contribute to meeting these requirements. See Paragraph 15.1.

Technical Specification

- 4.1 Velux Sun Tunnels are complete roof to ceiling skylight systems.
- 4.2 Velux Sun Tunnels (TWF, TWR and TLR) incorporate a square external roof window with integral flashings suitable for use with profiled metal and tiled roofing. The interior component of Velux Sun Tunnels comprises a ceiling mounted frosted acrylic double-glazed diffuser with white ceiling trim ring. The roof window is connected to the ceiling diffuser with either a flexible (TWF) or a rigid (TWR and TLR) highly reflective aluminium light transmission tunnel. The rigid aluminium 'light-tunnel' is made up of straight and adjustable-angle tube sections to allow passage through the roof-space.
- 4.3 The Velux TCR Sun Tunnel incorporates a light-capture dome above roof level attached to a highly reflective aluminium light transmission tunnel providing light to the interior via a diffuser unit mounted on the ceiling below. The rigid aluminium 'light-tunnel' is made up of straight and adjustable-angle tunnel sections to allow passage of light through the roof-space.
- 4.4 The minimum ceiling to roof distance is 400 mm for the TWF models and 900 mm for the TWR, TLR and TCR models.
- 4.5 The Velux Sun Tunnel models covered by the Appraisal are:

Sun Tunnel Models:

- TWF OK14: 350 mm diameter tube.
 - TWR OK10: 250 mm diameter tube.
 - TWR OK14: 350 mm diameter tube.
 - TLR OK14: 350 mm diameter tube.
 - TCR O14: 350 mm diameter tube.
- 4.6 Velux Sun Tunnels TWF, TWR and TLR all use a single pane of 4 mm toughened glass to the exterior, which has a coating that is designed to reduce the buildup of dirt and ease cleaning. Sun Tunnel TCR features an acrylic dome to the exterior. All Sun Tunnels use an acrylic double-glazed diffuser designed to be fixed to the ceiling.
 - 4.7 Velux Sun Tunnels TWF, TWR and TLR all feature an integrated proprietary flashing system suitable for a variety of roofing types. Flashings and roof detailing for the Velux Low-Pitch Sun Tunnels (TCR) must be specifically designed and is outside the scope of the appraisal and will need to be considered by the designer at the time of preparing design documentation.

Handling and Storage

- 5.1 Handling and storage of all components of Velux Sun Tunnels is under the control of the Sun Tunnel installer. Components must be kept dry and under cover at all times. Care must be taken to avoid surface damage to the window components and flashings during the installation process.

Technical Literature

- 6.1 Refer to Velux New Zealand Ltd for details of the current Technical Literature for Velux Sun Tunnels. 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 Velux Sun Tunnels are for use on roofs of buildings to provide natural light into interior spaces within buildings. Velux offer four models of Sun Tunnels. The TWF model features flexible internal ducting and the TWR, TLR and TCR models use rigid ducting. All models are suitable for roof pitches between 15° and 60°, however the TCR model can be used at pitches between 0° and 60°.
- 7.2 Velux Sun Tunnels are suitable for most existing timber framed roofs. For such installations, it is important that the roof structure is checked by a suitably qualified person for structural adequacy and suitability of the existing roof cladding.
- 7.3 When installed on new roofs, whenever possible the installation should be carried out concurrently with the roof cladding installation.

Structure

Wind

- 8.1 Velux Sun Tunnels are suitable for use in NZS 3604 Wind Zones up to and including Extra High.

Snow

- 8.2 Velux Sun Tunnels are suitable for use in areas where buildings are designed for a 1kPa snow loading.

Point Loads

- 8.3 Velux Sun Tunnels have not been tested for point loads from AS/NZS 1170 because the size of the Sun Tunnels would not require a point load to be applied.

Durability

Serviceable life

- 9.1 Velux Sun Tunnels are expected to have a serviceable life of at least 15 years, provided they are maintained in accordance with this Appraisal and the Technical Literature.
- 9.2 On exposure to the weather, the coil coated aluminium may gradually lose the original surface finish. A faster reduction in both surface finish and overall serviceable life can be anticipated in severe industrial, geothermal and marine exposures.

Maintenance

- 9.3 The exterior glazing surfaces of Velux Sun Tunnels can only be cleaned from the exterior of the building.
- 9.4 The glazing and external surfaces of Velux Sun Tunnels can be cleaned using a mild, non-abrasive glass cleaner along with a soft brush or other non-abrasive applicator to maintain the surface appearance. Solvent-based cleaners must be avoided when cleaning the acrylic dome on the TCR model as they may damage the surface.



- 9.5 The interior diffuser pane of the Velux Sun Tunnels can be cleaned from the inside. Before cleaning, the diffuser can be removed according to the installation instructions. Solvent-based cleaners must be avoided when cleaning the plastic interior components as it may damage the surface.
- 9.6 Keep all leaves clear from around Sun Tunnels. Make sure all exposed fasteners are secure. Inspect cladding and flashing for excessive wear or scratches on the cladding finish. Scratches in the cladding finish may be fixed with touch up paint available through Velux. Damaged claddings or flashings should be replaced as soon as they are detected.

Prevention of Fire Occurring

- 10.1 Separation or protection must be provided to Velux Sun Tunnels 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

- 11.1 Velux Sun Tunnels when installed in accordance with this Appraisal and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

Internal Moisture

- 12.1 Experience has shown that in normal domestic or similar applications, ceiling mounted double-glazed acrylic diffusers do not pose a significant risk of condensation when correctly installed.

Ventilation

- 13.1 Velux Sun Tunnel models TWR OK14 and TWF OK14 can be fitted with the Velux ZTV ventilation adaptor which is available from Velux New Zealand Limited. It allows the connection of any in-line mechanical ventilation device so extract ventilation can be provided without the need for additional roof penetrations. The Velux Sun Tunnel, when fitted with the ventilation adaptor, will contribute to the compliance of a building with NZBC Clause G4. Consideration must be given to the 'mechanical ventilation' required for a particular space by the designer. NZBC Acceptable Solution G4/AS1 provides guidance on required ventilation.

Natural Light

- 14.1 Velux Sun Tunnels all contain transparent apertures that will contribute to the compliance of a building with NZBC Clause G7. Consideration of the amount of illuminance provided by the Sun Tunnel for a particular space will depend on a wide range of factors unique to each installation – e.g. room size, position, sun orientation, angle, etc. The use of Velux Sun Tunnels to supplement natural light from other sources is an Alternative Solution to G7.

Energy Efficiency

- 15.1 Velux Sun Tunnels have R-values that satisfy the minimum requirements for skylights, all exceeding R 0.31 m²K/W as specified in NZBC Verification Method H1/VM1 and NZBC Acceptable Solution H1/AS1. Where the total area of skylights exceeds 1.5 m² or 1.5% of the total roof area [whichever is the greater] the calculation or modelling methods of NZS 4218 must be used for building designs.

Installation Information

Installation Skill Level Requirements

- 16.1 The installation of Velux Sun Tunnels must be completed by installers trained by Velux New Zealand Ltd or by competent, experienced tradespersons with an understanding of roof window installation and weathertightness details.

System Installation

- 17.1 Installation must be completed in accordance with instructions given in the Velux Sun Tunnels installation instructions and this Appraisal.

Health and Safety

- 18.1 There are no particular health and safety issues relating to the installation or use of Velux Sun Tunnels. Installers must however observe safe working practices for working on roofs and at heights.

Basis of Appraisal

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

Tests

- 19.1 Velux Sun Tunnels have been subjected to dynamic weather resistance testing by a NATA (National Association of Testing Authorities) registered laboratory in Australia.

Investigations

- 20.1 Velux Sun Tunnels have been assessed for resistance to impact loads, snow loads and resistance to wind pressures (non-cyclonic regions). These assessments have been reviewed by BRANZ and were found to be satisfactory.
- 20.2 An assessment was made of the durability of Velux Sun Tunnels by BRANZ.
- 20.3 The window units have been assessed for thermal resistance by BRANZ experts.
- 20.4 Site visits have been carried out by BRANZ to assess fit for purpose and the practicability of installation, and to assess in service performance.
- 20.5 Weathertightness detailing of the Velux Sun Tunnels has been assessed by BRANZ and found to be satisfactory. Instructions for installation of units and associated flashing components for different roof types have also been reviewed and found to be satisfactory.
- 20.6 The Technical Literature for Velux Sun Tunnels has been examined by BRANZ and found to be satisfactory.

Quality

- 21.1 The manufacture of Velux Sun Tunnels 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 UES (Uniform Evaluation Service) Evaluation Report Number 199 which covers quality aspects associated with Velux Sun Tunnel TCR model. BRANZ has also taken note of ETA Denmark European Technical Assessment ETA-13/0764 of 14/10/2015 which covers Velux Sun Tunnel models TWF, TWR, TLR and Velux Flashings.
- 21.2 The quality of materials, components and accessories supplied to the market is the responsibility of Velux New Zealand Ltd.
- 21.3 Quality of installation on site of Velux Sun Tunnel components and accessories is the responsibility of the installer.
- 21.4 Designers are responsible for building design, and specification of natural lighting and ventilation systems.
- 21.5 Building owners are responsible for any required maintenance of Velux Sun Tunnel in accordance with the advice of Velux New Zealand Ltd.



Sources of Information

- AS 4285: 1995 Skylights.
- AS/NZS 1170.0: 2002 Structural design actions - Permanent, imposed and other actions.
- NZS 3604: 2011 Timber Framed Buildings.
- NZS 4218: 2009 Thermal Insulation - Housing and small buildings.
- NZS 4223.4: 2016 Code of practice for glazing in buildings - Dead, wind and snow loading.
- 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 7, 01 January 2017].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



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In the opinion of BRANZ, **Velux Sun Tunnels** 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 **Velux New Zealand 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. **Velux New Zealand 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 **Velux New Zealand 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 **Velux New Zealand Ltd** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

23 June 2017