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Attention: J. Lukaszewicz

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Durability Appraisal of Cavity Flashing Systems

1. Introduction

Les Boulton & Associates Ltd (LBA) was requested by *Vanluk Design Ltd* (J. Lukaszewicz) to carry out a durability appraisal on the Vanluk MG range of cavity flashing systems. The Vanluk cavity flashing systems (models MG-50, MG-50E2, MG-100) are an air seal flashing designed for cavity construction where a pipe, cable, tubing, or conduit penetrates through a building's cladding and then goes through the air seal membrane. The air seal membrane may be a rigid air barrier (RAB board) or a building wrap paper. The Vanluk cavity flashing system once installed creates an air seal between a penetration and the air barrier membrane.

The Vanluk range of cavity flashing systems is specifically designed for installation in a drained and ventilated cavity wall cladding system. The MG-50 range is an internal cavity flashing system for small pipes, tubing, cable and conduit penetrations through cavity wall cladding systems. The MG-50 cavity flashings come in a range of penetration sizes. The MG-50 cavity flashings maintain the integrity of the air seal in the cladding cavity and they also assist the external rain screen to maintain weathertightness. MG-50 flashings are provided with a pre-cut hole to fit a standard range of pipes and cables, with custom hole sizes and flashing shapes also available.

Designed specifically for use in residential buildings, the MG-50 E2 option cavity flashing incorporates a butyl rubber flashing which extends out from the penetration in the air seal membrane. The MG-100 range of internal cavity flashings complements the MG-50 range, but the MG-100 flashings are designed to handle larger penetrations through different size cavities. The MG-100 cavity flashings come in a range of penetration sizes.

The Vanluk cavity flashing systems provide a simple and effective approach to dealing with construction issues associated with penetrations through cavity wall claddings. The Vanluk system gives a systematised, repeatable method of construction without undue reliance on the skill level of an installer. The Vanluk system avoids compromising the integrity of the air seal membrane when a penetration pipe or cable is pulled through a wall cavity after installation.

Butyl tape is provided with the MG-50 and MG-100 cavity flashings. The butyl tape adheres to the air seal membrane quickly, efficiently, and without a long curing time. The *Thermoprene* used in the MG-50 flashing acts as a backer-rod and bond-breaker for the sealing compound

applied on the external cladding face between the penetration and the cladding. The EVA foam used in the MG-100 flashing acts as a backer-rod and bond-breaker for the sealing compound applied on the external cladding face between the penetration and the cladding.

The Vanluk cavity flashing system has been installed and trialed during the testing of a modern wall cladding system to determine if the proprietary cladding complied with the requirements of AS/NZS 4284: 2008, “Testing of Building Facades”. The Vanluk cavity flashing system has also been tested to the NZ Building Code, External Moisture Verification, Method E2/VM1.

Models of sections through the Vanluk MG-50 E2 and MG-100 cavity flashing systems installed inside wall cavities are shown in *Figure 1*. The following technical data sheets and background information were provided by Vanluk to assist with a durability appraisal of the materials used to manufacture the MG-50, MG-50 E2 and MG-100 cavity flashing systems:

- *Evaluation of components used in Vanluk cavity flashing systems*; NZ Product Accelerator, Engineering Department, University of Auckland, September 2015.
- MG-50 technical data sheet, pipe and cable cavity flashing system, Vanluk Design Ltd, 2015.
- MG-50 Option E2 technical data sheet, pipe and cable cavity flashings Vanluk Design Ltd, 2015.
- MG-100 technical data sheet, pipe penetration cavity flashing systems, Vanluk Design Ltd, 2015
- Installation manual for cavity flashing systems; Vanluk Design Ltd, 2015.
- Butyl tape type 5931, technical data sheet, Tapespec Ltd, Auckland, 2015.
- *Evadure* EVA foam, technical data sheet, Nexus Foams Ltd, Auckland, 2015.
- *Thermoprene* EVA30, technical data sheet, HS Material Co Ltd, Korea, 2015.
- *Sikaflex* AT-Façade, technical data sheet, Sika (NZ) Ltd, 2013.

2. Materials used in the Vanluk MG-50, MG-50 E2 and MG-100 cavity flashing systems

2.1 *Thermoprene* for MG-50 and MG-50 E2 cavity flashings

Thermoprene B75EN is a fully cross-linked EPDM/polypropylene thermoplastic. Injection moulded *Thermoprene* is designed to replace thermoset elastomers such as EPDM and traditional thermoplastics. *Thermoprene* B75EN provides the performance of a vulcanised rubber with the advantage of low-cost thermoplastic processing.

Thermoprene is not affected by moisture and it has excellent chemical stability under normal operating temperatures and conditions. *Thermoprene* is light and it has rubber-like elasticity. *Thermoprene* material is widely used for the gaskets on curtain wall facades of buildings.

2.2 *EvaDure* EVA foam pads for MG-100 cavity flashing range

Evadure EVA30 foam is a closed-cell chemically cross-linked foam with very good mechanical and physical properties. EVA30 polyolefin foam does not absorb moisture which may be present in a wall cavity. EVA foam is very durable, inert and exhibits good chemical resistance.

The EVA30 laminate foam used in the MG-100 cavity flashing system has a pressure-sensitive adhesive applied on one side and a butyl laminate applied on the other side.

2.3 High performance elastomeric sealant

Sikaflex AT-Façade is an one-part, moisture-curing elastomeric sealing compound based on silane-terminated polymers. It is especially formulated to allow for movement at connection joints on porous and non-porous substrates. The high performance joint sealant has very good weatherability and high UV resistance.

The Sikaflex AT-Façade properties include movement capability with low stress on the substrate, colour stability, and good durability in external applications. The sealant has excellent workability, good adhesion on porous & non-porous substrates, and primer-less adhesion to many substrates.

2.4 Self-adhesive butyl rubber tape

Butyl rubber tapes used as flashings are good materials for air permeability compared to other elastomers used in the construction industry. The self-adhesive double-sided butyl tape offers fast and easy installation. Flashings using butyl rubber tape ensure excellent adhesion. The butyl tape provides good water tightness even after a long period of service. However, butyl tape is not designed for use in outdoor applications exposed to UV and the weather.

3. Durability assessment of Vanluk cavity flashing systems

The Vanluk range of cavity flashing systems for installation in the drained and ventilated wall cavities of modern façade systems are fabricated using the following materials:

- *Thermoprene* for the MG-50 and MG-50 E2 cavity flashing range
- *EvaDure* EVA foam for the MG-100 cavity flashing range
- High performance elastomeric sealant
- Self-adhesive butyl tape

The polymeric compounds used in the Vanluk cavity flashing systems have been appraised for performance and durability. The polymers used to fabricate the internal flashings are high quality and they have very good durability. Because the flashings are installed in a wall cavity they are not subjected to exposure to sunlight ensuring that the flashing materials do not suffer UV degradation during service.

The high performance sealing compound that is extruded into the gap between a pipe penetration and the external cladding during installation of the flashing system has excellent UV resistance. The high performance sealing compound used should provide about ten years of service. However, the sealing compound may need to be replaced with the same product (*Sikaflex*) after about ten years in service in order to maintain the weathertight seal at the cladding penetration.

4. Durability appraisal of Vanluk cavity flashing systems

A durability appraisal of the materials employed in the Vanluk cavity flashing systems has been carried out. The durability assessment has shown that the cavity flashings are protected against degradation by appropriate choice of high quality materials. The materials employed in the Vanluk cavity flashing systems are suitable to withstand exposure to New Zealand weather conditions. The likelihood of degradation occurring on the flashing materials inside a wall cavity during service is very low.

The sealing compound exposed on an external cladding penetration should be inspected periodically. The application of new sealant may be required in the penetration gap after about ten years in service. To ensure that the expected durability of a cladding system is achieved, including cavity flashings, appropriate inspection and maintenance by the asset owner should be carried out at intervals as recommended by the cladding system manufacturer.

5. Conclusions

A review of the design of the Vanluk cavity flashing systems and evaluation of the technical data sheets for the materials employed has been carried out.

The assessment of the degradation resistance of the materials comprising the Vanluk cavity flashing system has shown that the flashings will meet the durability requirements of the NZ Building Code, Clause B2 *Durability* to give at least 15 years of service.

Report prepared by:

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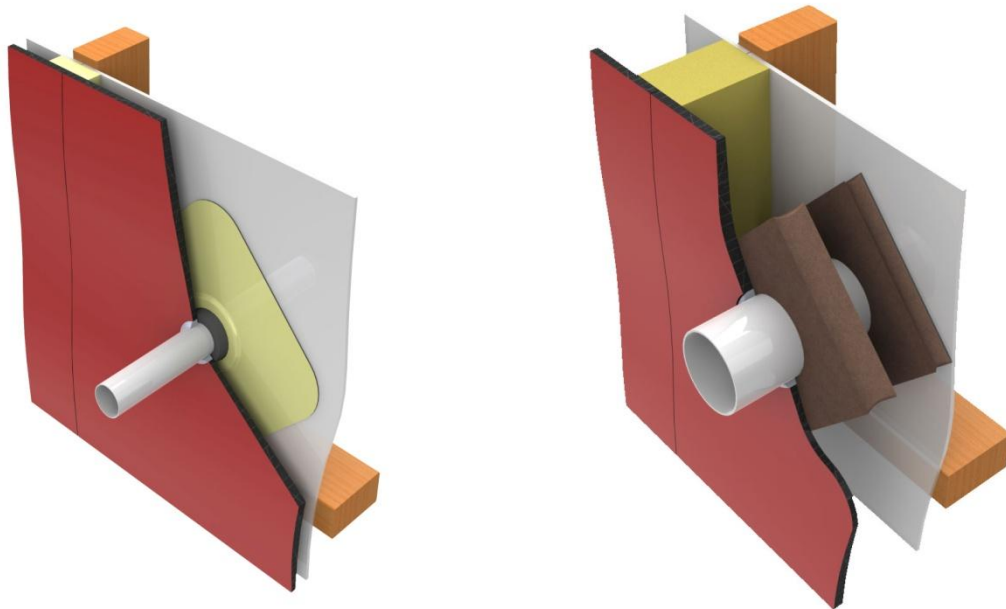


Figure 1.

The MG-50 E2 cavity flashing system is shown on the left.

The MG-100 cavity flashing system is shown on the right.