TECHNICAL BULLETIN

Durability of Built-Up Sill Flashing Method Using *SIGA Majvest 500 SA®* and *SIGA Wigluv®*

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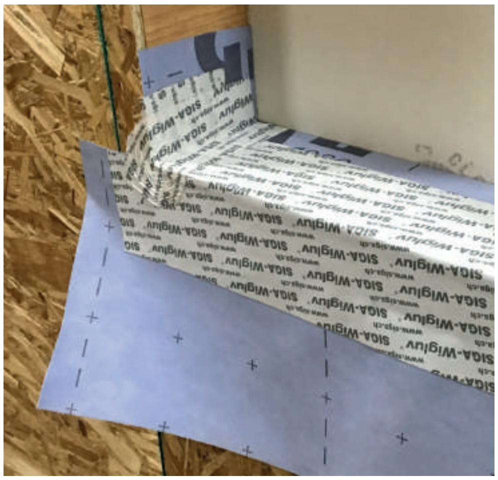

SIGA Majvest 500 SA® is a vapor-permeable, self-adhered weather-resistive barrier membrane created for high performance air-barrier assemblies. It is used in combination with SIGA Wigluv® to assemble a fully-adhered, VOC-free rough-opening sill preparation, maximizing ease of install and durability while minimizing excessive material thickness.

This bulletin will outline the increased durability and performance characteristics achieved in a built-up sill treatment of SIGA Wigluv® over SIGA Majvest 500 SA®, as tested by a third-party building science engineering firm.

An Introduction to Flashing

“Flashing” is a general term for any building material that prevents, diverts, or directs water away from entering building wall and roof assemblies. Exposed flashings are made of sheet metals, while concealed flashings are also made of flexible synthetic materials that conform more readily to complex shapes and building interfaces.

Poorly detailed and improperly installed flashing (Figure 1) is a leading cause of moisture damage in buildings. It is therefore important to understand proper detailing, installation methods, and the implications of choosing the right flashing material. Window and doors (fenestrations) are a critical piece of the water protection system, and flashing is used around fenestration frames to ensure a water tight installation.

Figure 1

Flashing Material Types

Self-adhered membranes are the most common rough opening flashing material and are comprised of an adhesive and a facer material. Common flashing types have either vulcanized rubber, modified asphalt (SBS), or butyl-based compound adhesives and are faced with a thin film of polyethylene or metal (Figure 2). These membranes were adapted from the roofing industry as their flexibility and impermeability are desirable at these critical interfaces. The waterproofing industry as a whole is continuously evolving, leading to new product categories such as liquid applied flashings and high-performance acrylic tapes.

Acrylic tapes, typically consist of a reinforced polyethylene facer and an acrylic adhesive (Figure 3). This makes acrylic tape thinner, more flexible, and more adhesive than asphalt or butyl-based membranes. In the case of acrylic SIGA Wigluv®, this tape was developed originally as a high-performance air-barrier component. Similar to the roofing technology cross-over observed years before, acrylic SIGA Wigluv® was discovered to possess numerous properties desirable for flashing applications.

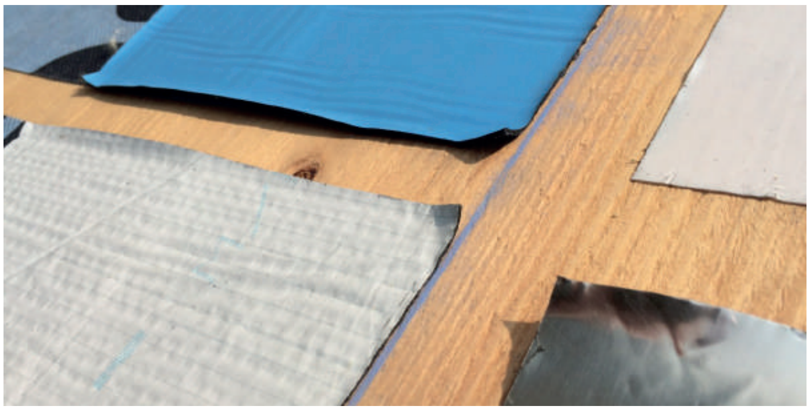

Figure 2

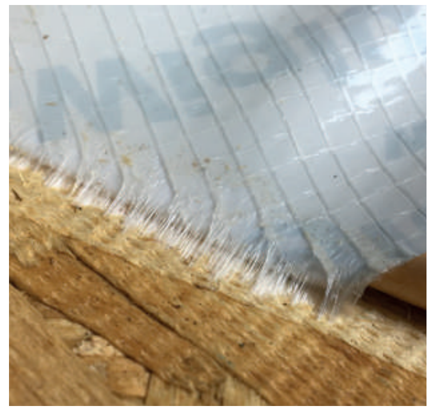

Figure 3

SILL-SPECIFIC FACTORS

Damage resistance during construction is an important risk factor affecting long-term reliability of all waterproofing materials. Window sills are particularly susceptible, as they experience significant abuse during window installation (Figure 4) and throughout the construction phase when the opening is used for passage of workers and materials. In addition, the horizontal or low-slope surface of the sill is also more likely to encounter pooling water during its service life. Therefore, robustness and durability are of particular importance to flashing material and design choice for the sills of rough openings.

Figure 4

In terms of current test standards for sills, SIGA Wigluv® already meets the stringent requirements set forth in the generally accepted AAMA 711 standard. However, this standard does not simulate actual installed product durability. To test the in-place robustness of flashing systems, new ‘drop’ test and a ‘drag’ test methodologies were created to simulate potential damage mechanisms that may occur during window installation.

TEST 1: DROP IMPACT

Drop testing consisted of assessing the impact resistance of the flashing system against a rapid and forceful strike at an oblique angle. This type of damage may be experienced if installers accidentally drop a window and the corner of the frame strikes the sill flashing.

The system set-up (Figure 5) included an angled base plate, where the flashing system was placed, and a weighted metal frame (drop-dart). Testing included both a high and medium drop height. The high drop height roughly simulated the force incurred by a 100 lb (45 kg) window being dropped approximately 4 inches (10 cm). The medium drop height approximated the same window being dropped roughly 2 inches (5 cm). Several commonly used flashing systems were tested for comparative purposes. Failure was defined as visible penetration through the flashing membrane system.

Results (Table 1) revealed that all thin acrylic pressure sensitive tapes tested were vulnerable to large impact forces and that modifications needed to be made to improve resilience. The inclusion of SIGA Majvest 500 SA® beneath one layer of SIGA Wigluv® significantly improved resilience against strike penetration (Figure 6), while the inclusion of two layers of SIGA Wigluv® above the SIGA Majvest 500 SA® provided similar resilience to typical modified asphalt peel and stick flashing membranes.

Figure 5

Table 1: Drop Testing Results

Flashing Membrane	**Medium Height (Passed of 10)**	**Maximum Height (Passed of 10)**
Foil Faced Butyl	8	0
PP Faced Rubberized Asphalt	10	9
PE Faced Acrylic Adhesive (alt. brand)	0	0
SIGA Majvest 500 SA + SIGA Wigluv (1 layer)	10	6
SIGA Majvest 500 SA + SIGA Wigluv (2 layer)	10	10

Figure 6

TEST 2: SURFACE DRAG

Abrasion is another common damage mechanism that may be experienced during construction. For example, window installers may slide or shift windows into place while resting on the sill flashing resulting in abrasion damage. To simulate this potential abrasive damage mechanism a simple drag test was devised. The test involved using the same apparatus as the drop testing, however was modified to simulate dragging of a window frame.

The test consisted of first dropping the abrasion apparatus (Figure 7) approximately 3/4” (19 mm) onto the flashing system, and then second, moving the substrate and flashing system under the static abrasion apparatus at a constant speed (~6.5 inches/minute or 165 mm/min) for approximately 4 inches (102 mm). Weight was added to the abrasion apparatus, to approximately 75 lbs (34 kg) in total, to increase the severity of testing and more accurately reflect a pressure point on the flashing membrane.

The results from the drag testing can be seen in Table 2. Similar to the drop testing, results showed that a single layer of acrylic adhesive tape was insufficient to resist the abrasion test. However the placement of SIGA Majvest 500 SA® beneath a layer or two layers of SIGA Wigluv® improved resilience significantly. No penetration to the substrate was observed for samples using the SIGA Majvest 500 SA® and SIGA Wigluv® combination (Figure 8). The combined SIGA® system is similar in abrasive durability as the butyl type and modified asphalt self-adhered flashing membranes which were concurrently being tested.

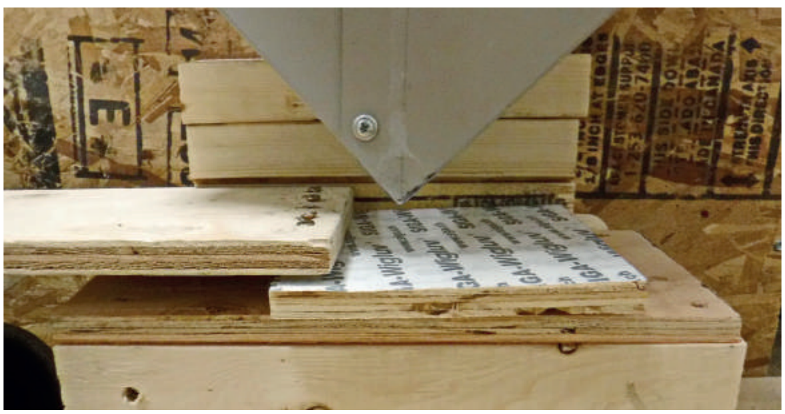

Figure 7

Table 2: Drag Testing Results

Flashing Membrane	Results (Passed of 5)
Foil Faced Butyl	5
PP Faced Rubberized Asphalt	5
PE Faced Acrylic Adhesive (alt. brand)	0
SIGA Majvest 500 SA + SIGA Wigluv (1 layer)	5
SIGA Majvest 500 SA + SIGA Wigluv (2 layer)	5

Figure 8

CONCLUSIONS

Resilience is an important waterproofing characteristic and must be considered when selecting a flashing system. The relative thinness of polyethylene and acrylic adhesive tapes present an issue in this regard, however if proper procedures during construction are taken (including installation diligence and proper inspection and repair) potential damage can be eliminated. If job-site damage is a concern during construction, the resilience of the SIGA Wigluv® flashing system can be improved by including the installation of the SIGA Majvest 500 SA® membrane as a base layer. Damage to the top layer of SIGA Wigluv® should be minimized as much as possible during construction and noticeable tears or holes should be patched with SIGA Wigluv® accordingly. However, if a hole or tear goes unnoticed, the SIGA Majvest 500 SA® membrane provides an adequate second line of defense against water intrusion.

SIGA Wigluv® tape itself provides numerous benefits when used as a self-adhered flashing, including increased malleability, strong adhesion to multiple substrates, protection against water penetration, and the additional benefit of allowing wet substrates to dry. SIGA Wigluv® has undergone and passed the rigorous AAMA 711 testing, which is the current industry standard for self-adhered flashing in North America.

Durability testing showed that the inclusion of a SIGA Majvest 500 SA® base layer considerably increased resilience against potential construction damage. Based on the stringent AAMA 711 testing and additional experimentation, ***SIGA Wigluv® built-up over a base layer of SIGA Majvest 500 SA® is suitable for use as a sill flashing method in fenestrations.***

This research was completed in partnership with RDH Building Science Inc.