RDH Building Science Inc. (RDH) is pleased to provide this letter outlining the performance properties of SIGA's interior construction tape product, SIGA-Rissan®, as compared with the related prescriptive and functional requirements of Canadian building codes. SIGA-Rissan® is a reinforced, semi-transparent polyethylene (PE) tape with an acrylic pressure-sensitive adhesive. The tape is green coloured and is labeled with SIGA-Rissan® on the non-adhesive side. SIGA-Rissan® is intended to be used in interior applications as an air barrier accessory and to seal polyethylene sheet type vapour control layers.

**Introduction**

The primary focus of our engagement with SIGA is to perform a review of the current 2015 National Building Code of Canada (NBC), and the Ontario Building Code (OBC), from the consolidation period of July 1st, 2019, for requirements related to the use of SIGA-Rissan® as an interior air barrier accessory and to seal polyethylene type vapour barriers. In conjunction, RDH has reviewed third-party material testing reports submitted by SIGA for conformance to applicable testing standards.

This letter summarizes our review of the Canadian building codes (NBC and OBC) and lists relevant referenced material specifications and standards, and also our interpretation of the functional requirements. This is compared to evidence submitted from a third-party testing report. The submitted report from Intertek is labelled “EVALUATION OF RISSAN MEMBRANE TAPE” and is numbered “H7840.01-106-31” and dated “07/30/18”.
Canadian Building Code Requirements

The primary use of SIGA-Rissan® is to provide continuity to interior air barrier systems (e.g. taped sheathing boards or taped sheets/membranes). SIGA-Rissan® can also be used to seal polyethylene type vapour barriers. SIGA-Rissan® may serve both roles when the polyethylene type sheet is designated as the primary air barrier layer.

The NBC has equal or more stringent requirements for air barriers and vapour barriers than the OBC. It should be noted that the OBC substitutes Section 9.36 Energy Efficiency, as found in the NBC, with the Supplementary Standard SB-10 “Energy Efficiency Requirements” and the Supplementary Standard SB-12 “Energy Efficiency for Housing”. However, requirements found in both SB-10 and SB-12 related to air barriers are equal or lesser than those of the NBC. Therefore, the NBC will be used to define the requirements for SIGA-Rissan®. The NBC outlines the requirements for air barriers and air barrier systems in the following articles:

- 5.4.1.1. Required Resistance to Air Leakage
- 5.4.1.2. Air Barrier System Properties
- 9.25.3.1. Required Barrier to Air Leakage
- 9.25.3.2. Air Barrier System Properties
- 9.25.3.3. Continuity of the Air Barrier System
- 9.36.2.9. Airtightness
- 9.36.2.10. Construction of Air Barrier Details

The Canadian building codes outlines the requirements for vapour barriers and related systems in the following articles:

- 5.5.1.1. Required Resistance to Vapour Diffusion
- 5.5.1.2. Vapour Barrier Properties and Installation
- 9.25.4.2. Vapour Barrier Materials
- 9.25.4.3. Installation of Vapour Barriers

Canadian building codes do not state acceptable solutions or prescriptive reference standards for air/vapour barrier accessory materials, except for one instance which is noted below, nor do they state minimum physical property requirements. It is therefore in the opinion of RDH, that to qualify for use under the NBC and OBC, SIGA-Rissan® must demonstrate that it fulfills the objectives outlined in associated sentences and clauses of the building codes.

Canadian building codes are objective based codes, which in summary signifies that each sentence is intended to fulfill one or multiple stated objectives. Objectives are general statements and are qualitative in nature and describe undesirable situations in which the code would like to avoid. As the objectives are general in nature, functional statements are provided in Division A of the building code to relate the objectives of stated sentences to physical conditions in buildings.
For example, Sentence 9.25.3.1. (1) of the NBC requires that walls include an air barrier system. One *objective* statement associated with Sentence 9.25.3.1(1) indicates that “damage to or deterioration of building element” (OS2.3) should be limited for structural safety. The building code than assigns one or more *functional statements* related to the *objective*. For this example, one *functional statement* states; “to resist the transfer of air through environmental separators” (F55). By meeting all *functional statements*, the *objectives* of the related Sentence should be satisfied.

Acceptable solutions that qualify under referenced material standards or meet prescriptive requirements, satisfy both the *objective* and *functional statements* of the related *sentences* and qualify for use under the building code. Materials complying to referenced material standards or meet prescriptive requirements demonstrate compliance by completing prescribed material tests which assess relevant physical properties of the material in question against minimum requirements.

However, when there are no explicit prescriptive or acceptable solutions, as in the case of interior air/vapour barrier tapes, the material in question should fulfill the intended *objective* and *functional statements* as defined by related *sentences*. Similar to prescriptive requirements, materials may do this by demonstrating suitable material properties through physical testing. Determining minimum adequate values can be challenging as little research may completed in some areas (e.g. sheathing tapes), however providing engineering judgement from experience should provide suitable confidence.

In RDH’s opinion to adequately perform its expected roles as an air/vapour barrier accessory, SIGA-Rissan®, must demonstrate its physical capacity to meet the relevant *functional statements*. The related *functional statements* associated with the listed *articles* can be found in Appendix B.

In summary the *functional statements* require that SIGA-Rissan® withstand expected loads and forces, limit vapour diffusion, restrict air movement (responsible for majority of moisture and hazardous containment movement), and to resist deterioration from expected in-service conditions. The ability to resist air transfer and resist vapour diffusion has been compared with similar prescriptive requirements of the building code, while additional analysis was required to help determine strength and durability requirements.

**Related Prescriptive Requirements**

To help define the physical property requirements of SIGA-Rissan®, RDH has evaluated the building code prescriptive requirements related to air and vapour barrier materials. Listed below are the NBC requirements:

- Air barrier materials must have an air leakage permeance of less than 0.02 L/s·m² at 75 Pa in accordance with ASTM E2178, “Standard Test Method for Air Permeance of Building Materials” or meet CAN/ULC-S741, “Standard for Air Barrier Materials - Specification”. Primary air barrier materials used in Part 9 buildings should conform with CAN/ULC-S741, which requires additional UV and heat conditioning prior to air permeance testing as compared with ASTM E2178. As SIGA-Rissan® is not the primary air barrier material and should be used as an
interior tape, air permeance testing to ASTM E2178, in RDH’s opinion, should be sufficient to demonstrate acceptable air resistivity (Ref. 9.36.2.10.).

→ Building assemblies must comply with CAN/ULC-S742, “Standard for Air Barrier Assemblies – Specification” or ASTM E2357/E2357M, “Standard Test Method of Determining Air Leakage of Air Barrier Assemblies”. Building assemblies must demonstrate an air leakage rate below 0.2 L/s·m² when tested at 75 Pa (Ref. 9.36.2.9.). This is the only prescriptive requirement that includes accessories, however includes them as part of an air barrier assembly. To satisfy testing, the accessory must be used in conjunction with a primary air barrier material. In the opinion of RDH, as SIGA-Rissan® may be used in several different types of building assemblies this testing is not strictly applicable. It is the responsibility of the designer/builder to demonstrate sufficient air leakage resistance of project specific assemblies.

→ The vapour permeance of vapour barrier materials must not be greater than 60 ng/(Pa·s·m²) when measured in accordance with ASTM E96/96M “Standard Test Method for Water Vapour Transmission of Materials” using the desiccant-method (dry-cup) (Ref. 9.25.4.2). Although SIGA-Rissan® is not strictly a vapour barrier by definition, its role in sealing laps and penetrations in the vapour barriers make SIGA-Rissan® a functional element in the vapour barrier system and therefore should be sufficiently vapour impermeable.

To perform our technical evaluation, RDH has reviewed the third-party testing report provided by SIGA and compared the results against the minimum related prescriptive requirements listed above. Table 1 summarizes the material property testing requirements and results.

<table>
<thead>
<tr>
<th>MATERIAL PROPERTY</th>
<th>MATERIAL PROPERTY TEST</th>
<th>MINIMUM REQUIREMENTS</th>
<th>SIGA-RISSAN® TESTING RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Vapour Permeance</td>
<td>ASTM E96/E96M – Desiccant Method</td>
<td>≤ 60 ng/(Pa·s·m²) ≤1.08 US Perms</td>
<td>5.04 ng/(Pa·s·m²) 0.088 US Perms</td>
</tr>
<tr>
<td>Air Leakage @75Pa</td>
<td>ASTM E2178</td>
<td>&lt;0.02 L/s·m² @75 Pa</td>
<td>0.0000 L/(s·m²)</td>
</tr>
</tbody>
</table>

Based on RDH’s review of the provided laboratory testing reports and results referenced above, it is our opinion that SIGA-Rissan® meets the objective and functional intent of being sufficiently air and vapour impermeable.

Functional Material Requirements

After an extensive literature review, it was determined that there are few consensuses based North American specifications or standards used to evaluate construction tapes (including sheathing tapes and interior tapes). As such RDH has drawn on the experience of the Canadian Construction Materials Centre (CCMC) as a reference to help assess other identified functional requirements. CCMC has developed an evaluation standard for sheathing tapes (07 25 20 -Sheathing Tapes) to help demonstrate compliance with the functional requirements of the building code for sheathing tapes.
A significant number of sheathing tapes have undergone CCMC evaluations to demonstrate compliance and gain acceptance from Canadian Authorities Having Jurisdiction (AHJ) in lieu of prescriptive requirements. However, CCMC evaluations are not explicitly required by Canadian building codes. These evaluation reports contain CCMC’s opinion on the acceptability of a product or its compliance to the building code based on technical evidence submitted from third party testing agencies.

While the primary functional performance of sheathing tapes and those of interior air/vapour barrier tapes may be different, their expected in-service loads and forces are similar (air pressure differential stresses, adhesion expectations, etc.). In-service conditions which may deteriorate interior tapes are similar but lesser than to exterior sheathing tapes. Interior tapes are less exposed to detrimental environmental stressors, such as UV radiation during construction, less heat exposure, and to less exposure to water. See Appendix A for further information on the conditioning procedures undertaken during testing.

CCMC testing generally focuses on strength properties and adhesion properties of the tape after various conditioning procedures simulating expected in-service conditions. CCMC standardized testing focuses on the following physical properties for sheathing tape:

- **Tensile strength** - The tensile strength of tape can be defined as the ultimate force that is required to pull apart the tape when stretched parallel to its long axis. The reported force is the maximum force experienced during testing.

- **Elongation** - The elongation of tape is measured at the point of breaking when subject to tensile strength testing. Elongation measurements provide the extent of movement that can be withstood before breakage.

- **Peel Adhesion** - Peel adhesion is one of the most important properties of tapes and typically defines the bonding strength between the adhesive and the substrate. In principle, peel adhesion is a measure of how well the tape will stick to any given surface. Peel adhesion is the force that is required to pull tape away (at an angle of 90° or 180° to the plane of application) from the substrate. See ASTM D3330 for different peel adhesion testing procedures.

- **Dynamic Shear or Bond Strength** - This property reflects the adhesive strength of a bond when subjected to a shear force (a force that is applied parallel to the adhesive and substrate surface). This force may be experienced by building tapes when two connected substrates try to separate directly away from each other.

- **Flagging or conformance to shapes** - Flagging is a measurement of how well tape will conform to wrapping around a round object. This is important when utilizing tapes to seal transitions and objects that are not flat, such as penetrations, or around corners. The test consists of attaching a weight to a strip of tape. The weighted tape is than rotated around a steel rod, so that it overlaps itself approximately 1/2 of the circumference of the rod. While the leading edge of the tape (with weight attached) is oriented normal to the ground, the top layer of tape is than cut at the apex of the rod. With approximately 1/4 of rod
circumference overlap remaining, any tape that then naturally pulls away from this overlap is measured lengthwise (in millimetres) from the cut location.

- **Cold Temperature Application:** Tapes may be applied in various temperature conditions during construction. Cold temperatures can impact the backing and adhesive components of tape, however, construction tapes should be able to be applied in and sustained in relatively cold temperatures before the adhesive strength is impacted.

- **UV and heat aging:** During construction tapes may be exposed to ultra-violet (UV) radiation from the sun. UV exposure can have significant deleterious affects on plastic and polypropylene type materials. Heat aging simulates the impact of elevated temperatures and also simulates/accelerates the deterioration process known as oxidization. Oxidization occurs to polymers during natural aging and can be accelerated by heat and/or UV exposure. It is important to demonstrate that UV or heat do not significantly impact the integrity of the material.

- **Shelf life or accelerated aging:** This conditioning simulates an extended period of natural aging without the material being subjected to elevated temperatures or UV exposure.

- **Exposure to water:** Tape may experience some wetting either from rain or other sources while being installed. Tape should be expected to maintain adhesive or bonding strength to its substrate when exposed to water.

**Testing substrates**

The adhesive strength between tape and its substrate is critical to product application and it is extremely important to define suitable substrates. While the testing of all possible substrates in all conditions is not economically feasible, testing of common substrates provides reasonable indication of performance for common interactions.

For this evaluation the majority of the testing occurred between SIGA-Rissan® (adhesive) to SIGA-Rissan®'s PE backing (substrate) and to one of SIGA’s polyethylene barrier type materials, SIGA-Majrex®. From RDH’s understanding, these two materials will be commonly used together. The overlapping of tapes in both air and vapour barriers is common and a potential point of delamination. SIGA-Majrex® is a PET fibre-reinforced modified polyethylene / polyamide type vapour retarder. Contact SIGA for more information regarding SIGA-Majrex®.

As peel adhesion testing is a good indication of bond between adhesive and substrate, numerous substrates were selected for standardized testing (@ 23°C). Theses substrates represent common building materials. It should be noted that differences between conditioning testing results and standard testing results for SIGA-Rissan® backing and SIGA-Majrex®, may not reflect the differences expected when all of the other substrates are also conditioned.

Adjoining materials used in air barrier systems must be compatible as defined by the code. It is advised that building professionals contact SIGA to determine all suitable substrates for SIGA-Rissan®.
Testing Results

To perform our technical evaluation, RDH has reviewed the third-party testing report provided by SIGA. RDH has evaluated several material physical tests performed on SIGA-Rissan®, which are similar to the strength and durability tests performed in several past CCMC sheathing tape evaluations (CCMC 11362-R & CCMC 14018-R). As CCMC evaluation procedures are not publicly available direct comparison is not explicitly possible in all circumstances. CCMC evaluations also do not specify what exact conditioning has been completed. For these reasons, we have included the minimum values of sheathing tape evaluations by CCMC as a reference when comparable, however we do not use them to define our evaluation of the material.

A number of the physical property tests performed do not have explicit pass/fail criteria. As such RDH provides an engineering opinion and evaluation of the results where relevant. The material property tests results are summarized in Table 2 with RDH’s evaluation of the results following.
### TABLE 2 - STRENGTH AND DURABILITY PROPERTY TESTING RESULTS

<table>
<thead>
<tr>
<th>MATERIAL PROPERTY</th>
<th>MATERIAL PROPERTY TEST</th>
<th>CCMC MIN. REQUIREMENTS</th>
<th>SIGA-RISSAN® TESTING RESULTS†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>ASTM D3750 - Breaking Strength and Elongation of Pressure-Sensitive Tapes</td>
<td>N/A‡</td>
<td>1.89 N/mm</td>
</tr>
<tr>
<td>Elongation</td>
<td>ASTM D3750 - Breaking Strength and Elongation of Pressure-Sensitive Tapes</td>
<td>N/A‡</td>
<td>733 %</td>
</tr>
<tr>
<td>Adhesion @ 23°C</td>
<td>ASTM D3330 - (Method A 180° Peel) - Peel Adhesion of Pressure Sensitive Tape</td>
<td>≥ 0.15 N/mm</td>
<td>Rissan - 1.03 N/mm Majrex - 0.534 N/mm Majpell - 0.633 N/mm OSB - 1.09 N/mm Plywood - 1.08 N/mm Steel - 1.01 N/mm Vinyl - 0.994 N/mm</td>
</tr>
<tr>
<td>Adhesion w/ Heat Aging</td>
<td>ASTM D3330 – Method A (180° Peel) - w/ heat aging only*</td>
<td>≥ 0.15 N/mm</td>
<td>Rissan - 1.24 N/mm Majrex - 1.18 N/mm</td>
</tr>
<tr>
<td>Adhesion w/ UV Exposure and Heat Aging</td>
<td>ASTM D3330 – Method A (180° Peel) w/ UV exposure and heat aging *</td>
<td>≥0.20**</td>
<td>Rissan - 1.07 N/mm Majrex - 1.08 N/mm</td>
</tr>
<tr>
<td>Adhesion @ -10°C</td>
<td>ASTM D3330 – Method A (180° Peel) w/ conditioning and testing at -10°C*</td>
<td>N/A</td>
<td>Rissan - 1.16 N/mm Majrex - 1.18 N/mm</td>
</tr>
<tr>
<td>Shear Strength @ 23°C</td>
<td>ASTM D1000 – Bond Strength</td>
<td>N/A</td>
<td>Rissan - 1.48 N/mm Majrex - 1.45 N/mm</td>
</tr>
<tr>
<td>Shear Strength w/ UV Exposure and Heat Aging</td>
<td>ASTM D1000- Bond Strength w/ UV exposure and heat aging*</td>
<td>N/A</td>
<td>Rissan - 1.45 N/mm Majrex - 1.35 N/mm</td>
</tr>
<tr>
<td>Shear Strength w/ Water Immersion</td>
<td>ASTM D1000 – Bond Strength w/water immersion*</td>
<td>N/A</td>
<td>Rissan - 1.74 N/mm Majrex - 1.44 N/mm</td>
</tr>
<tr>
<td>Bond Separation or Flagging</td>
<td>ASTM D1000 Bond Separation</td>
<td>&lt;2.0mm</td>
<td>0.0 mm (@23°C) 0.0 mm (130°C) * 0.7 mm (Water Immersion) *</td>
</tr>
</tbody>
</table>

* See Appendix A for specific conditioning procedures.
**CCMC sets a requirement of ≥0.20 N/mm for adhesion after only heat aging, not including UV exposure. Heat aging procedures may differ.
† The substrates to which SIGA-Rissan was applied to are listed in the testing results column before the corresponding result.
‡ CCMC testing reports for CCMC 11362-R & CCMC 14018-R show two different tensile strength and elongation minimum requirements.

### Discussion of Results

The analysis presented herein represents RDH’s opinion on the results provided by the third-party testing agency. Where comparisons are made against minimum CCMC values testing procedures have been identified as comparable. Where comparisons are not made, RDH provides further analysis and engineering judgement.
Tensile Strength Testing and Elongation: The tensile strength testing results demonstrate that SIGA-Rissan® is extremely pliable when exposed to tensile forces. The flexibility of the SIGA-Rissan® tape should allow any significant movement to be accommodated without the tape breaking. CAN/CGSB-51.34-M86, “Vapour Barrier, Polyethylene sheet for Use in Building Construction” requires a minimum tensile strength of 12MPa in the machine direction. When converted to a load/width measurement (assuming a 6-mil or 0.1524mm polyethylene barrier) this translates to 1.83 N/mm for polyethylene sheet (as compared to 1.89 N/mm for SIGA-Rissan® tape). The tensile strength and elongation therefore, in the opinion of RDH, meet the functional requirements outlined within the building code.

Peel adhesion: The standard peel adhesion testing (@23°C) results are larger than comparable CCMC peel adhesion minimum requirements on all substrates. It is RDH’s opinion that SIGA-Rissan exhibited acceptable peel adhesion with all substrates tested at standard temperature. The peel adhesion testing with conditioning (heat aging, UV exposure and heat conditioning, and cold temperature conditioning) all resulted in peel adhesion values larger than the standard temperature testing. It is postulated that the increase in peel adhesion is due to the time between application and testing, as well as in the case of heat conditioning, the increased curing of the acrylic adhesive. The standard peel adhesion testing was completed within one minute of application of tape to substrate as per ASTM D3330. This demonstrates a reasonable tack property of SIGA-Rissan® to the tested substrates. Typically, acrylic adhesives require hours or days to properly cure without additional treatment. The conditioned specimen’s adhesion strength remained above minimum CCMC values and demonstrated that the adhesive strength of the tape was not significantly affected from conditioning.

Shear strength or bond strength: Visual analysis of the standard shear strength testing results (@23°C) showed that SIGA-Rissan® failed in tensile strength rather than bond failure between the tape and the substrate (cohesive failure). This demonstrates that the bond strength between SIGA-Rissan®, its backing and SIGA-Majrex, is higher than the tensile strength of the tape. This indicates that when placed under shear stress, depending on the bonding area (a bonding area of 13mm wide x 13mm overlap was tested), SIGA-Rissan® will bond to the substrate until failure of the tape occurs. This type of failure is desirable as the elasticity of SIGA-Rissan® will allow for movement, and the bond strength will ensure proper adhesion during shear stress events. The differences between bond strength results and tensile strength results are due to testing method differences. Conditioning did not significantly impact the bond strength or the tensile strength of SIGA-Rissan® as demonstrated by the maximum decrease in bond strength (approximately 7% from standard testing to the UV and heat conditioning testing).

Flagging: The flagging results showed that little to no lift occurred when SIGA-Rissan® was wrapped around a 6mm steel diameter rod. See the Functional Material Requirements section for explanation of the test and results. The results demonstrate SIGA-Rissan®’s ability to conform to round shapes. All results are less than that recommended by CCMC testing of sheathing tapes.
Based on RDH’s review of the provided laboratory testing reports and results referenced above, and also on our interpretation of the *functional statements* outlined in the NBC, it is in our opinion that SIGA-Rissan® meets the *objectives* and intent of the NBC.

**Usage and Limitations**

RDH’s evaluation of SIGA-Rissan® for use as an air barrier accessory and vapour barrier tape are applicable provided that the conditions and limitations set below are followed:

→ Installation procedures and applications should follow all directions as provided by SIGA and adhere to the installation requirements outlined in the referenced building code *articles* in the Canadian Building Code Requirements section.

→ Air barrier systems require that all adjoining materials are suitable and compatible. Peel adhesion tests demonstrate adhesion strength suitability and in the opinion of RDH the following substrate showed acceptable peel adhesion strength at standard conditions:
  → SIGA-Rissan® (backing)
  → SIGA-Majrex®
  → SIGA-Majpell®
  → Oriented Strand Board (OSB)
  → Plywood
  → Steel
  → Vinyl

→ Extended compatibility of SIGA-Rissan® and the listed substrates was not tested. Building design professionals should confirm that all substrates to be used with SIGA-Rissan® are suitable. Contact SIGA for additional information on substrates.

→ As expected loads vary on a project specific basis, building design professionals should ensure air barrier systems are adequately supported and that the use of SIGA-Rissan® will fulfill all expected stresses.

→ Limited UV exposure had little impact on adhesion, but testing cannot be used to define exposure limits. RDH recommends that designers and builders contact SIGA for further guidance on UV exposure allowance.

→ Although heat aging had little impact on peel adhesion acceptable long-term storage was not tested. Please contact SIGA for further information on applicable storage length.

→ Issues related to combustibility or fire/smoke propagation fall outside the scope of this evaluation.

For more information regarding the physical properties of SIGA-Rissan® and its installation, storage, accessories, and handling, please contact a local SIGA representative.
Disclaimer

The opinions claimed herein represent RDH Building Science Inc. and are strictly based on the results of third-party testing agencies, Canadian building code prescriptive requirements and our understanding of the *functional statements*. This report does not constitute an endorsement of SIGA or SIGA products by RDH. The functional performance requirements of the building codes are based on RDH’s interpretations of the referenced specification standards, *functional and objective statements*, and our professional expertise in building enclosure engineering.

RDH can not be held liable for circumstances arriving due to the inadequacy of material specifications and testing standards.

RDH claims no responsibility for the results reported by the material testing facilities. Nor can RDH be held liable for misuse of the product or problems caused by poor installation, neglect or other person related factors associated with the use of SIGA-Rissan® or other SIGA products.

Conclusion

RDH performed a review of the NBC and OBC for prescriptive and functional requirements as related to the use of SIGA-Rissan® as an interior air barrier accessory and vapour barrier tape. In the opinion of RDH, the physical properties of SIGA-Rissan® as tested by third party agencies satisfies the performance and functional requirements for both roles, provided the terms in the Usage and Limitations section are heeded.

Please contact the undersigned for any questions regarding the provided information.

Yours truly,

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416 314 2328
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Appendix A
Conditioning Information
Conditioning Procedures

ASTM D3330 Peel Adhesion and ASTM D1000 Bond Strength with UV Exposure and Heat Aging

The specimens were individually prepared and then exposed to UV radiation in accordance with ASTM G154 Cycle I for 72 hours. SIGA-Rissan® samples were then subsequently heat aged in an oven for 168 hours at 90°C according to ASTM D3045 “Standard Practice for Heat Aging of Plastics Without Load” prior to being tested. UV and heat exposure were based on the upper limit of UV conditioning specified for an interior sheet vapour retarder evaluated by CCMC, however only one cycle of heat aging was performed as compared with two. The report is numbered #13278-R and the corresponding published document is titled Accelerated Aging Performance Evaluation of “Smart Vapor Retarder” (2010).

Additionally, heat aging procedures exceed those of Level 3 as defined in AAMA-711 “Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products”.

ASTM D3330 Peel Adhesion with Heat Aging Only

The specimens (including substrates) were individually prepared and placed in an oven for 240 hours at 60°C. Conditioning is based on CCMC shelf life conditioning. Heat aging is similar to ASTM D3611 however humidity was not controlled during conditioning. CCMC recommends that shelf-life be limited to one year.

ASTM D3330 Peel Adhesion at -10 °C

Tape and substrate specimens were prepared and placed within a freezer (-10°C) for 24 hours and then removed individually for peel adhesion testing. Testing was repeated with both tape and substrate being placed in freezer for 24 hours prior to preparation of samples. Samples were prepared within the freezer and than removed individually and tested again. Failure mechanisms were similar to the first testing procedure. The results of the former procedure are presented in this report.

ASTM D1000 Bond Strength after Water Immersion (Solvent Immersion)

The specimens were individually prepared and placed in an oven for two hours at 130°C according to ASTM D1000. Specimens were than submerged in water for 16 hours and allowed to dry prior to shear strength testing.

ASTM D1000 Flagging after 130 °C

The specimens were individually prepared and placed in an oven for two hours at 130°C according to ASTM D1000. Specimens were than cooled to room temperature prior to the flag test.
ASTM D1000 Flagging after Water Immersion

The specimens were individually prepared, conditioned for 24 hours at ambient lab conditions (similar to the standard test conditioning) and than immersed in water for 15 minutes. Specimens were allowed to dry prior to the flag test.
Appendix B

Associated Functional Statements
### TABLE B1 – BUILDING CODE FUNCTIONAL STATEMENTS

#### AIR BARRIER REQUIREMENTS

<table>
<thead>
<tr>
<th>National Building Code Article Reference</th>
<th>Functional Statement Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4.1.1. Required Resistance to Air Leakage</td>
<td>F40, F51, F52, F54, F55, F61, F62, F63</td>
</tr>
<tr>
<td>5.4.1.2. Air Barrier System Properties</td>
<td>F51, F55, F61, F63</td>
</tr>
<tr>
<td>9.25.3.1. Required Barrier to Air Leakage</td>
<td>F40, F44, F55</td>
</tr>
<tr>
<td>9.25.3.2. Air Barrier System Properties</td>
<td>F20, F40, F44, F55, F80</td>
</tr>
<tr>
<td>9.25.3.3. Continuity of the Air Barrier System</td>
<td>F01*, F40, F44, F55</td>
</tr>
<tr>
<td>9.36.2.9. Airtightness</td>
<td>F90</td>
</tr>
<tr>
<td>9.36.2.10. Construction of Air Barrier Details</td>
<td>F90</td>
</tr>
</tbody>
</table>

#### VAPOUR BARRIER REQUIREMENTS

<table>
<thead>
<tr>
<th>National Building Code Article Reference</th>
<th>Functional Statement Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5.1.1. Required Resistance to Vapour Diffusion</td>
<td>F63</td>
</tr>
<tr>
<td>5.5.1.2. Vapour Barrier Properties and Installation</td>
<td>F63</td>
</tr>
<tr>
<td>9.25.4.2. Vapour Barrier Materials</td>
<td>F62, F63, F80</td>
</tr>
<tr>
<td>9.25.4.3. Installation of Vapour Barriers</td>
<td>F63</td>
</tr>
</tbody>
</table>

*Note: This relates to chimney and gas vents and the surrounding construction that would permit air leakage from within the building into a wall or attic or roof space shall be sealed by non-combustible material to prevent such leakage.

### TABLE B2 – FUNCTIONAL STATEMENTS

<table>
<thead>
<tr>
<th>Functional Statement Number(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F01</td>
<td>To minimize the risk of accidental ignition.</td>
</tr>
<tr>
<td>F20</td>
<td>To support and withstand expected loads and forces.</td>
</tr>
<tr>
<td>F40</td>
<td>To limit the level of contaminants.</td>
</tr>
<tr>
<td>F44</td>
<td>To limit the spread of hazardous substances beyond their point of release.</td>
</tr>
<tr>
<td>F51</td>
<td>To maintain appropriate air and surface temperature.</td>
</tr>
<tr>
<td>F52</td>
<td>To maintain appropriate relative humidity.</td>
</tr>
<tr>
<td>F54</td>
<td>To limit drafts.</td>
</tr>
<tr>
<td>F55</td>
<td>To resist the transfer of air through environment separators.</td>
</tr>
<tr>
<td>F61</td>
<td>To resist the ingress of precipitation, water or moisture from the exterior or from the ground.</td>
</tr>
<tr>
<td>F62</td>
<td>To facilitate the dissipation of water and moisture from the building.</td>
</tr>
<tr>
<td>F63</td>
<td>To limit moisture condensation.</td>
</tr>
<tr>
<td>F80</td>
<td>To resist deterioration resulting from expected service conditions.</td>
</tr>
<tr>
<td>F90</td>
<td>To limit the amount of uncontrolled air leakage through the building envelope.</td>
</tr>
</tbody>
</table>
Appendix C

Referenced Material Standards
American Society for Testing and Materials (ASTM)


ASTM D3330 / D3330M – Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape

ASTM D3045 – Standard Practice for Heat Aging of Plastics Without Load

ASTM D3759 / D3759M – Standard Test Method for Breaking Strength and Elongation of Pressure-Sensitive Tape


ASTM E2178 - Standard Test Method for Air Permeance of Building Materials


ASTM D3611 – Standard Practice for Accelerated Aging of Pressure-Sensitive Tapes

Canadian Standards


CAN/ULC-S742 – Standard for Air Barrier Assemblies - Specification