

SECTION 07216 – SPRAY POLYURETHANE FOAM AIR/VAPOUR BARRIER SYSTEM

PART 1 – GENERAL

1.1 Scope:

All work done as part of Section 07216 must conform to Contract and Division 1 Requirements.

- 1.1.1** The work of this section shall include all labour, materials, equipment and installation methods required for installation of the Genyk SPF Air Barrier System. The work includes the primary air/vapour barrier components as well as accessory products necessary to the building's environmental separation (building wall envelope). The work includes but is not limited to the following:

1.1.1.1 Closed cell, medium density spray applied polyurethane foam insulation (ccMDSPF) applied to concrete, concrete block, exterior grade gypsum, plywood and other components of the environmental separator.

1.1.1.2 Self-Adhering Transition membranes at perimeter of all rough openings, dissimilar materials, roof tie-ins, interface between structural components (beams, columns and sheathing) and control and/or expansion joints.

1.1.1.3 Primers and sealants necessary to the performance of the ccMDSPF and the self-adhering membrane materials.

1.1.1.4 Formed metal insulation stops at horizontal and vertical cavity wall firestopping.

1.2 Related Work:

- 1.2.1** Section 04100 – Masonry Work
- 1.2.2** Section 06100 – Rough Carpentry
- 1.2.3** Section 07213 – Batt and Blanket Insulation
- 1.2.4** Section 07240 – Composite Building Panels
- 1.2.5** Section 07525 – Two Ply Modified Bituminous Roofing System
- 1.2.6** Section 07900 – Sealants & Caulking
- 1.2.7** Section 08110 – Steel Doors and Frames
- 1.2.8** Section 08520 – Extruded Aluminium Windows
- 1.2.9** Section 08900 – Extruded Aluminium Curtain Wall System
- 1.2.10** Section 09250 – Gypsum Board

1.3 References:

- 1.3.1** CAN/ULC-S705.1.15: Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material Specification.
- 1.3.2** CAN/ULC-S705.2.05-R2016: Spray Applied Rigid Polyurethane Foam, Medium Density – Application Specification.

1.4 Test Results:

- 1.4.1** Submit all test results for all materials used prior to commencing any air barrier system work. The following submittals at a minimum:

1.4.1.1 Test results for Genyk Boreal Nature⁺ sprayed polyurethane foam material being used as part of the Genyk SPF Air Barrier System. Genyk Boreal Nature⁺ meets or all performance criteria as listed in 2.1 Spray-in-Place Polyurethane Foam Insulation. Genyk Boreal Nature⁺ is a Genyk SPF Air Barrier System approved product.

1.4.1.2 Test results for all air barrier components including self-adhering transition membranes, self-adhering through wall flashings, membrane fastening devices, metal closure materials, etc. All materials must be listed as an approved component of the Genyk Air Barrier System.

1.4.1.3 A copy of the photo identification of the Genyk SPF Air Barrier System Certified Installer(s). Genyk Certified Installers must be listed as of “current standing” by the Urethane Foam Consultants (UFC) Certification Organization.

1.4.1.4 A copy of the certified UFC Contractor certificate demonstrating “current standing” within the (UFC) Certification Organization.

1.5 Mock-Ups:

1.5.1 Create a 5m² sample (minimum) in accordance with the Genyk Air Barrier System. The sample area should contain representative self-adhering membrane applications including dissimilar materials, rough openings and through-wall flashings. The sample must demonstrate the interface between Genyk Boreal Nature⁺ and associated air barrier system products.

1.5.2 Using the sprayed-in-place polyurethane foam and self-adhering membrane sample, all required daily tests must be performed to demonstrate compliance with the Genyk Air Barrier System. The following tests must be demonstrated (and done on a daily basis thereafter):

1.5.2.1 Genyk Boreal Nature⁺ core density test

1.5.2.2 Genyk Boreal Nature⁺ adhesion/cohesion test

1.5.2.3 Self-adhering transition adhesion test

The results of the tests must be recorded on the Genyk Air Barrier System Daily Work Sheet and submitted for approval.

1.6 Protective Measures:

1.6.1 Ensure all structures are well protected, in accordance with the manufacturer’s recommendations.

1.6.2 Protect all adjacent surfaces and equipment against any damage that may be caused by spray foam overspray beyond prescribed limits.

1.6.3 Neutralize any and all liquid waste products in accordance with CAN/ULC-S705.2 disposal methods. Ensure all solid waste products are also disposed of in accordance with CAN/ULC-S705.2 disposal procedures.

1.7 Delivery, Storage and Handling:

All air barrier system materials are to be delivered and stored in their original packaging bearing the manufacturer’s name, quantity, CCMC Evaluation Listing number, manufacturer date and expiry date (if applicable), and other pertinent technical information.

1.8 Quality Assurance:

1.8.1 All auxiliary air barrier materials must be installed by, or supervised by, a certified Genyk Air Barrier System installer. Certified Installer Photo ID must be available upon request.

1.8.2 All transition membrane materials must be installed by, or supervised by, a certified Genyk Air Barrier System installer. Certified Installer Photo ID must be available upon request.
Daily Testing— The Genyk Air Barrier System requires the installer to perform tests on the self-adhered transition membranes, any liquid-applied membranes and the sprayed polyurethane foam.

Self-adhered transition membranes require adhesion testing using COM-TEN Industries equipment (or equivalent). The minimum testing requirements for the self-adhered transition membranes are:

One test per 100m² of wall area, including a per project minimum of:

- One test of roof tie-ins (if applicable)
- One test of beam/column interface (if applicable)
- Two tests of base flashings (if applicable)
- Two tests of rough openings (if applicable)
- All control and/or expansion joints (if applicable)

1.8.3 All polyurethane spray foam insulation must be installed by, or supervised by, a certified Genyk Air Barrier System installer. Certified Installer Photo ID must be available upon request.

1.8.4 All polyurethane spray foam insulation daily testing and administration required for the CAN/ULC-S705.2 compliance is required as part of the Genyk Air Barrier System. To ensure compliance, daily work records are to be stored by the Contractor for seven years and made available to UFC and/or Genyk representatives upon request. The daily inspection requirements for polyurethane foam used as an air barrier material within the Genyk Air Barrier System include:

- ✓ Density check – every day, every substrate, every batch.
- ✓ Adhesion/Cohesion – every day, every substrate, every batch.
- ✓ Environmental tests – daily checks of humidity, wind speed, substrate temperature and ambient temperature.

1.8.5 Transition membranes are to be tested using the COM-TEN equipment (or equivalent) to ensure a minimum adhesion of 110 kPa. Tests are not required for mechanically fastened materials.

1.8.6 Every Genyk Air Barrier System project is subject to inspection by a UFC Certified Auditor. The number of inspections required is directly proportional to the size of the project and/or the requirements of the Consultant. At a minimum, a Genyk Air Barrier System must provide UFC certified audited inspections based on the following criteria:

Project Size	Required Inspection	Inspection Intervals
Up to 1000m ²	One	10 to 50% completion
1001 to 2000m ²	Two	10 and 50% completion
Over 2501m ²	Three	10, 50 and 90% completion

1.8.7 All daily work records must be available to the Consultant upon request.

1.8.8 Authorities related to the application of the Genyk Air Barrier System, including but not limited to, Genyk representatives, UFC auditors and Code officials shall be provided access to jobsite and daily work records upon request.

1.9 Environmental Requirements:

1.9.1 Apply spray polyurethane foam insulation only if the surface and ambient air temperatures are within the Genyk's prescribed limits (-10°C to +35°C). For transition membranes, strict adherence to the manufacturer's prescribed limits is required.

1.9.2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials. WHMIS guidelines are also to be used regarding labelling and provision of Material Safety Data Sheets (MSDS).

1.10 Surface Preparation:

- 1.10.1** Surfaces must be clean and dry as required by CAN/ULC-S705.2. The substrate must be free of all frost, dust, oil, grease, oxidization, or any other element that may affect adhesion of the air barrier system components.
- 1.10.2** All transition membranes must be installed prior to the application of the spray polyurethane foam insulation. Transition membranes must be those certified for use within the Genyk Air Barrier System. All membranes must be installed in accordance with manufacturer's guidelines.
- 1.10.3** All of the following construction elements must be completed prior to application of the Genyk Air Barrier System:
 - 1.10.3.1** Installation of masonry anchoring system.
 - 1.10.3.2** Installation of opening closures (wood or metal).
 - 1.10.3.3** Installation of any electrical or mechanical penetrations.
 - 1.10.3.4** Roofing membranes or waterproofing materials.
 - 1.10.3.5** Air/vapour barrier transition membranes.
 - 1.10.3.6** Sub-girt framing members for exterior cladding.
 - 1.10.3.7** Protection of adjacent areas.

1.11 Conditions of Use:

- 1.11.1** Follow Genyk's written instructions when spraying polyurethane foam material (refer to Genyk Boreal Nature+ technical data sheet when required).
- 1.11.2** Genyk's recommendations should be adhered to regarding ambient and substrate temperature limitations. Never spray polyurethane foam when there is a 17°C difference between ambient and substrate temperatures without the written approval of Genyk.

PART 2 – PRODUCTS

2.1 Spray-in-Place Polyurethane Foam Insulation

The Genyk Air Barrier System is limited to the use of Genyk Boreal Nature spray polyurethane foam insulation. The Boreal Nature+ product is a closed cell, medium density spray polyurethane foam (ccMDSPF).

- 2.1.1** Genyk Boreal Nature+ meets or exceeds the following CAN/ULC-S705.1 Material Standard performance requirements:

2.1.1.1	Blowing Agent -	Zero Ozone Depleting Substance.
2.1.1.2	LTTR R-Value (CAN/ULC-S770) -	2.02 K-m ² /W RSI @50mm (R11.5)
2.1.1.3	Compressive Strength (ASTM D1621) -	195 kPa
2.1.1.4	Core Density (ASTM D-1622) -	33 kg/m ³
2.1.1.5	Open Cell Content (ASTM D-6226) -	less than 1%
2.1.1.6	Tensile Strength (ASTM D1623) -	355 kPa
2.1.1.7	Vapour Permeance (ASTM E-96) -	37ng/Pa*s*m ²
2.1.1.8	Dimensional Stability (ASTM D-2126) -	9.8% volume change @ 70°C, 97% RH
2.1.1.9	Water Absorption (ASTM D-2842) -	0.8% by volume
2.1.1.10	Flame Spread (CAN/ULC-S102) -	200

2.2 Spray-in-Place Polyurethane Foam Insulation Primers

Genyk's guidelines on the use of ccMDSPF primers must be adhered to when installing Boreal Nature+ to various substrates.

2.3 Self-Adhering Transition Membranes

All self-adhering products are to be approved (listed) by the Genyk Air Barrier System. Self-adhering transition membranes must be SBS modified bitumen complete with a cross-laminated polyethylene film.

2.3.1 Self-adhering transition membranes must meet or exceed the following criteria:

2.3.1.1	Thickness -	1.0mm (40mils)
2.3.1.2	Air Leakage (ASTM E283-91) -	less than 0.005 L/s*m ² @ 75 Pa
2.3.1.3	Vapour Permeance (ASTM E-96) -	49 ng/Pa*m ²
2.3.1.4	Elongation (ASTM D412 modified) -	200%
2.3.1.5	Tensile Strength (ASTM D882) -	3.4 MPa @ 5000 psi
2.3.1.6	Puncture Resistance (ASTM E154) -	178N minimum

2.4 Self-Adhering Through-Wall Flashing Membranes

All self-adhering products are to be approved (listed) by the Genyk Air Barrier System. Self-adhering through-wall flashing membranes must be SBS modified bitumen complete with a cross-laminated polyethylene film.

2.4.1.1	Thickness -	1.1mm (49mils)
2.4.1.2	Air Leakage (ASTM E283-91) -	less than 0.005 L/s*m ² @ 75 Pa
2.4.1.3	Vapour Permeance (ASTM E-96) -	2.8 ng/Pa*m ²
2.4.1.4	Elongation (ASTM D412 modified) -	200%
2.4.1.5	Tensile Strength (ASTM D882) -	3.95 MPa @ 5000 psi
2.4.1.6	Puncture Resistance (ASTM E154) -	180N minimum

2.5 Self-Adhering Membrane Primers

Manufacturer's guidelines on the use of self-adhering primers must be adhered to when installing membrane materials. Primers must be consistent with the self-adhered membrane being installed. No alternative primers can be used with a self-adhering membrane without the written approval of the membrane manufacturer.

2.6 Metal Closures

When required, metal closures will be installed at all rough openings where insulation terminates. Closures shall be a minimum of 24-gauge galvanized steel manufactured to the ASTM Z275 standard or aluminum zinc alloy coated steel manufactured to the ASTM AZ150 standard. The dimensions of the closure are specific to the thickness of the spray foam and the cavity. The closure shall extend 12mm beyond the foam thickness and be within 12mm of the inner wythe of the veneer. The closures shall be fastened to masonry/concrete with Tapcon screws. When installing to metal studs, self-tapping sheet metal screws, non-corrosive finish, of adequate length to penetrate the sheathing and stud framing by 12mm shall be used.

2.7 Auxiliary Air Barrier Materials

Materials used to ensure the continuity of the Genyk Boreal Air Barrier System shall be checked for compatibility with other materials. The air barrier material manufacturers shall give written confirmation that their materials are compatible with Genyk Boreal Nature⁺ sprayed polyurethane foam. Auxiliary air barrier materials may include – sealants, housewraps, tape, fastening bars, fasteners and sheet metal.

2.8 Cavity Wall Firestopping

2.8.1 Horizontal Firestopping – When the cavity wall air space is greater than 25mm, a preformed, minimum 24-gauge metal angle, with steel core zinc coating, as stipulated in ASTM A525 (galvanized steel G-90) shall be installed every 3 meters. Dimensions must allow the horizontal section to extend 12mm within the brick veneer masonry joint.

2.8.2 Vertical Firestopping

When the cavity wall air space is greater than 25mm, a preformed, minimum 24-gauge metal angle, with steel core zinc coating, as stipulated in ASTM A525 (galvanized steel G-90) shall be installed every 20 meters. Dimensions must allow the horizontal section to extend 12mm within the brick veneer masonry joint.

PART 3 – EXECUTION

3.1 Preparation

- 3.1.1** Ensure all surfaces are clean, dry and free of oil, wax, grease, dirt, excess mortar, rust, oxidation and other contaminants.
- 3.1.2** Ensure new concrete has cured for a minimum of 14 days.
- 3.1.3** All joints with a span greater than 12mm must be covered with sheet metal or filled with mortar before applying self-adhering membranes or sprayed polyurethane foam.
- 3.1.4** Prime all surfaces that are to receive self-adhering transition membranes at rates suggested by manufacturer. Allow primer to 'tackup' for approximately 30 minutes prior to application of the self-adhering membrane.
- 3.1.5** Prime all sheet metal surfaces that are to receive sprayed polyurethane foam with a Genyk recommended primer.
- 3.1.6** Install metal closures around rough openings and any other areas where a foam stop is required.
- 3.1.7** Install cavity wall firestopping when air space is greater than 25mm.

3.2 Transition Membrane Application

Install transition membranes at control joints, connections between dissimilar materials (i.e. concrete block to sheathing), beams, rough openings, roof parapets and any and all other connections that may experience differential movement. When installing transition membranes:

- 3.2.1** Only apply membranes to primed surfaces.
- 3.2.2** Roll self-adhering membranes with a steel or polypropylene hand roller to ensure full contact.
- 3.2.3** Connect to all window, door and parapet blocking connections by mechanically fastening with a metal bar or strap.
- 3.2.4** Lap sheet membrane a minimum of 75mm on each connection substrate and overlap a minimum of 50mm at joints.

3.3 Spray-in-Place Polyurethane Foam Insulation Application

Genyk Boreal Nature⁺ spray applied polyurethane foam insulation must be installed in accordance with the CAN/ULC-S705-2 Application Standard and the requirements of the Genyk Air Barrier System. When installing Boreal Nature⁺:

- 3.3.1** Install to a tolerance of +6mm/-0mm in relation to the specified thickness.
- 3.3.2** Avoid the formation of sub-layer air pockets when installing SPF.
- 3.3.3** Avoid spraying foam on any surfaces other than those indicated. Use drop sheets or masking tape to protect other surfaces.
- 3.3.4** Once fully cured, remove all overspray from non-prescribed surfaces.
- 3.3.5** Repair all spray foam damaged by other trades.
- 3.3.6** Ensure the completed spray foam will be covered by finishes within 6 months of installation. Exposure to UV rays beyond 6 months will have a detrimental effect on the SPF's physical properties. A Genyk representative will need to be consulted on any foam exposed beyond 6 months.

- 3.3.7** Do not spray polyurethane foam any closer than 75mm from chimneys, lighting fixtures and other heat sources. Do not spray the inside of any electrical junction boxes.
- 3.3.8** When installing the system below temperatures of 10°C, self-adhering membranes specifically formulated for cold applications must be used. If proper adhesion is not achieved, the membranes will require mechanical fastening.
- 3.3.9** All mechanical fixtures should be covered with polyurethane foam to reduce thermal bridging.
- 3.3.10** Spray polyurethane foam cannot be sprayed at temperatures below -10°C or above 35°C. The Genyk manufacturer needs to be consulted on all applications when there is a significant difference in temperature between the ambient and substrate. Only with Genyk's written approval can foam be sprayed when there is a difference of 17°C.

3.4 Site Testing

- 3.4.1** The certified installer shall conduct daily tests required by the Genyk Air Barrier System and CAN/ULC-S705.2.
- 3.4.2** The certified installer shall complete the daily work record and record the results of all testing. Copies of the daily work record shall be forwarded to the Consultant, UFC and/or Genyk upon request. The SPF Contractor must store copies of the daily work record for seven years.
- 3.4.3** All costs incurred for daily testing are the responsibility of the Certified Genyk Air Barrier System Contractor.

3.5 Third Party Inspection

- 3.5.1** UFC third party site inspection is a requirement of the Genyk Air Barrier System. The certified contractor is responsible to arrange for all testing requirements based on the size of the project.
- 3.5.2** If the inspection reveals any installation defects, the UFC Licensed Contractor shall immediately rectify all defects at his/her cost.