**SECTION 07216 – MEDIUM DENSITY SPRAY POLYURETHANE INSULATION**

## 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 Closed Cell, Medium Density Spray Polyurethane Foam Insulation (ccMDSPF). The work includes the spray foam insulation and air-sealing components necessary to the building's environmental separation. 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** Closed cell, medium density spray applied polyurethane foam insulation (ccMDSPF) applied around penetrations in the building separation.

**1.1.1.3** Closed cell, medium density spray applied polyurethane foam insulation (ccMDSPF) applied to exterior walls and covered by ultraviolet membrane coatings to provide outboard insulation to various areas including below grade applications.

**1.1.1.3** Thermal barriers to ensure all spray foam materials are protected in accordance with local code requirements.

**1.1.1.4** Primers and sealants necessary to the performance of the ccMDSPF and the thermal barrier materials.

**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 07840 – Fire Stopping & Smoke Seals
**1.2.7** Section 07900 – Sealants & Caulking
**1.2.8** Section 08110 – Steel Doors and Frames
**1.2.9** Section 08520 – Extruded Aluminium Windows
**1.2.10** Section 08900 – Extruded Aluminium Curtain Wall System
**1.2.11** Section 09250 – Gypsum Board
**1.2.12** Division 15 – Mechanical
**1.2.13** Division 16 – Electrical

**1.3 References:**

**1.3.1** CCMC Evaluation Listing – 14025-L
**1.3.2** CAN/ULC-S705.1-15: Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material.
**1.3.3** CAN/ULC-S705.2-05: Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application.

**1.4 Material Test Results:**

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

**1.4.1.1** CAN/ULC S705.1 Test results associated with CCMC Evaluation. SPF material must meet or exceed all performance criteria as listed in 2.1 Spray-in-Place Polyurethane Foam Insulation. SPF material must have a CCMC Evaluation Listing with testing done in accordance with CAN/ULC S705.1 Material Standard.

**1.4.1.2** A copy of the photo identification in accordance with the Urethane Foam Consultants (UFC) training and certification process.

**1.5 Installer Test Results:**

**1.5.1** Installers must perform density and adhesion daily tests as required by the CAN/ULC S705.2 Installation Standard. The following tests must be demonstrated (and done on a daily basis thereafter):

**1.5.1.1** SPF core density test

**1.5.1.2** SPF adhesion/cohesion test

The results of the tests must be recorded on the UFC Daily Work Sheet and submitted for approval. A jobsite label, listing the Installer's licence number and material's CCMC listing number must be attached in a visible area of the building (preferably the electrical panel box).

**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 ccMDSPF 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 ccMDSPF materials must be installed by, or supervised by, a certified UFC installer. Certified Installer Photo ID must be available upon request.

**1.8.2** All polyurethane spray foam insulation daily testing and administration required for CAN/ULC-S705.2 compliance is required as part of the UFC quality control program. The daily inspection requirements for ccMDSPF include:

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

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

**1.8.4** Authorities related to the application of the ccMDSPF, including but not limited to, material manufacturers, 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 manufacturer's prescribed limits (i.e. -10$^0$C to +40$^0$C).

**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 ccMDSPF.

**1.11 Conditions of Use:**

**1.11.1** Follow manufacturer's written instructions when spraying polyurethane foam material (refer to manufacturer's ccMDSPF technical data sheet when required).

**1.11.2** Manufacturer's recommendations should be adhered to with regard to ambient and substrate temperature limitations. Never spray polyurethane medium density foam when there is a 17$^0$C difference between ambient and substrate temperatures without the written approval of SPF material manufacturer.

**PART 2 – PRODUCTS**

**2.1 Closed Cell, Medium Density Spray Polyurethane Foam Insulation**

All ccMDSPF products are to be approved (listed) by Urethane Foam Consultants (UFC). SPF materials are to be closed cell, medium density spray polyurethane foam (ccMDSPF).

**2.1.1** ccMDSPF materials must meet or exceed the following minimum criteria standards:

- **2.1.1.1** LTTR Thermal Resistance (CAN/ULC S770) - 1.96 K*m$^2$/W @50mm (R5.7/inch)
- **2.1.1.2** Compressive Strength (ASTM D1621) - 228 kPa
- **2.1.1.3** Tensile Strength (ASTM D1623) - 206 kPa
- **2.1.1.4** Air Permeance (CCMC 07273) - 0.001 L/(m$^2$*s) @75Pa, 100mm
- **2.1.1.5** Core Density (ASTM D-1622) - 32.0 kg/m$^3$
- **2.1.1.6** Open Cell Content (ASTM D-6226) - 2.8 %
- **2.1.1.7** Vapour Permeance (ASTM E-96A) - 34ng/Pa*s*m$^2$ @50mm
- **2.1.1.8** Dimensional Stability (ASTM D-2126) - +13% volume change @70$^0$C, 97% RH
- **2.1.1.9** Water Absorption (ASTM D-2842A) - 1.6% by volume
- **2.1.1.10** Smoke Development (CAN/ULC-S102) - 300
- **2.1.1.11** Flame Spread Value (CAN/ULC-S127) - 285
- **2.1.1.12** Time to Occupancy (CAN/ULC S774) - 24 hours

**2.2 Spray-in-Place Polyurethane Foam Insulation Primers**

Manufacturer's guidelines on the use of primers must be adhered to when installing ccMDSPF materials. All metal surfaces are to receive a primer recommended primer (by SPF manufacturer).

**2.3 Thermal Barriers**

All ccMDSPF must be covered by an applicable thermal barrier. The thermal barrier must be a CCMC approved material. ccMDSPF installers must install the approved thermal barrier in accordance with manufacturer's instructions.

**2.3 Approved Products**

**2.3.1.1** ccMDSPF Products:

Genyk 'Boreal Nature ELite'

**2.3.1.2** Thermal Barriers:

International Fireproof Technologies 'DC315'

**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** Prime all sheet metal surfaces that are to receive sprayed ccMDSPF with a primer suggested by the SPF manufacturer.

**3.2 Spray-in-Place Polyurethane Foam Insulation Application**

All spray applied polyurethane foam insulation must be installed in accordance with the CAN/ULC-S705-2 Application Standard. When installing ccMDSPF:

**3.2.1** Install to a tolerance of +6mm/-0mm in relation to the specified thickness.

**3.2.2** Avoid the formation of sub-layer air pockets.

**3.2.3** Avoid spraying foam on any surfaces other than those indicated. Use drop sheets or masking tape to protect other surfaces.

**3.2.4** Once fully cured, remove all overspray from non-prescribed surfaces.

**3.2.5** Repair all spray foam damaged by other trades.

**3.2.6** Do not spray ccMDSPF any closer than 75mm from chimneys, lighting fixtures and other heat sources. Do not spray the inside of any electrical junction boxes.

**3.2.7** All mechanical fixtures should be covered with ccMDSPF to reduce thermal bridging.

**3.2.8** ccMDSPF cannot be sprayed at temperatures below $-10^0$C or above $40^0$C. The SPF manufacturer needs to be consulted on all applications when there is a significant difference in temperature between the ambient and substrate. Only with manufacturer's written approval can foam be sprayed when there is a difference of $17^0$C.

**3.3 Site Testing**

**3.3.1** The certified installer shall conduct daily tests required by the CAN/ULC-S705.2 Installer Standard.

**3.3.2** 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 upon request.

**3.3.3** All costs incurred for daily testing are the responsibility of the Certified ccMDSPF Contractor.