Part 1 General

1.01 RELATED SECTIONS

.1 Section 07 92 10 - Joint Sealing.

.2 Section 08 44 13 - Glazed Aluminum Curtain Walls.

1.02 REFERENCES

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM C1029-15. Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.

.2 ASTM D3574-16. Standard Test Methods for Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams.

.2 Underwriters' Laboratories of Canada (ULC).

.1 CAN/ULC-S101-14. Standard Method of Fire Endurance Tests of Building Construction and Materials.

.2 CAN/ULC-S102-10. Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies.

.3 CAN/ULC-S705.1-15. Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material Specification.

.4 CAN/ULC-S705.2:2005-R2016. Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density - Application.

1.03 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit manufacturer's printed product literature and data sheets for sprayed insulation. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit 2 copies of WHMIS MSDS.

.4 Provide the CCMC Evaluation Report and the manufacturer’s documentation confirming material has been evaluated and conforms to the requirements of CAN/ULC-S705.1.

.5 Submit evaluation report or listing from a recognized evaluation service.

.6 Submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.8 Submit manufacturer’s installation instructions. Indicate preparation, installation sequencing, installation requirements and techniques. Indicate product storage and special handling criteria. Indicate limitations of the material and cleaning procedures.

.9 Submit Sustainable Design Submittals for LEED in accordance with Section 01 35 21 - LEED Requirements.

.1 Submit project Waste Management Plan and Waste Reduction Workplan highlighting recycling and salvage requirements.

.2 Submit calculations on end of project recycling rates, salvage rates, and landfill rates demonstrating that the specified rate of construction wastes were recycled or salvaged.

.3 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer and post-industrial content, and total cost of materials for project.

.4 Submit evidence that project incorporates required percentage of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.04 QUALITY ASSURANCE

.1 Manufacturer: company with experience in producing material required for this project, with sufficient production capacity to produce and deliver required units without causing delay.

.2 Applicators performing work under this section to be trained under the manufacturer's quality assurance program. Applicators to be trained by the manufacturer and licensed by a recognized certification service.

1.05 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up 10.0 square meters minimum of foamed in place polyurethane insulation. Include one inside corner, one outside corner. Include the complete perimeter of a door or window opening. When approved, Mock-up may be part of finished work.

.3 Allow 24 hours for inspection of mock-up by Consultant before proceeding.

1.06 SAFETY REQUIREMENTS

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations.

.1 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection and protective clothing when applying foam insulation.

.2 Workers must not eat, drink or smoke while applying foam insulation.

1.07 DELIVERY STORAGE AND PROTECTION

.1 Deliver store and protect all materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Store materials off ground, indoors, in dry location in clean, dry, well ventilated area.

.4 Store and protect materials from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.08 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction / Demolition Waste Management And Disposal.

.2 Develop Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 35 21 - LEED Requirements.

.3 Remove for reuse and return to manufacturer, all pallets, crates, padding, and packaging materials.

.4 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

.6 Dispose of waste foam daily in location designated by Consultant.

.7 Decontaminate empty drums in accordance with foam manufacturer's instructions. Divert metal drums from landfill to metal recycling facility as approved by Consultant

1.09 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.

.2 Ventilate area by introducing fresh air and exhausting air continuously during and 24 hours after application to maintain non-toxic, unpolluted, safe working conditions.

.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.01 MATERIALS

.1 Two component Insulation: to ASTM C1029 and CAN/ULC-S705.1, Type 2, two component, closed cell, spray applied rigid polyurethane foam. Medium density. Zero ozone depletion blowing agent.

- .1 Core density: minimum 40 kg/m3. (2.5 pcf).
- .2 Compressive strength: minimum 207 kPa. (30psi).
- .3 Tensile strength: 414 kPa. (60 psi).
- .4 Water absorption: less than 2 % by volume.
- .5 Dimensional stability: aged 28 days at 70°C at 97±3% RH: less than 9.0 % by volume.
- .6 Long term thermal resistance: minimum RSI 0.9 per 25 mm.
- .7 Water vapor permeance @ 50 mm thickness: less than 60 ng/Pa x second x square meter.
- .8 Specific gravity: 1.14 - 1.23.
- .9 Maximum thickness per pass: 50 mm.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

.3 Accessories: air / vapour barrier membranes, mastics, sealants, liquids complete with required primers to complete the transitions for the air barrier system.

.4 One component Insulation: low pressure build, single component, low expansion, low density polyurethane foam. Zero ozone depletion propellant. Provided in an aerosol can. Designed for sealing gaps at the perimeter of window, doors and spandrel panels and other openings. Properties as follows:

.1 Density: to ASTM D3574: 0.94 to 1.56 pounds per cubic foot.

.2 Compression set: to ASTM D3574: 8.7 psi @ 10% deformation.

.3 Full cure: 24 hours.

.4 Acceptable Product: TremGlaze LEF by TREMCO.

2.02 EQUIPMENT

.1 Provide spray equipment in accordance with CAN/ULC-S705.2 and the equipment manufacturer's recommendations for specific type of application.

.2 Record equipment settings on the Daily Work Record as required by CAN/ULC- S705.2.

.3 Each proportioner unit to supply only one spray gun.

Part 3 Execution

3.01 EXAMINATION

.1 Verify that conditions of substrate are acceptable for sprayed insulation application accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Consultant. Prior to commencement of work, report in writing any defects or conditions that may adversely affect the performance of products installed under this section.

.3 Proceed with installation only after unacceptable conditions have been remedied. Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.

3.02 PROTECTION

.1 Mask and cover adjacent areas to protect from over spray.

.2 Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.

.3 Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes. Provide for make-up air.

.4 Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spay area.

3.03 SURFACE PREPARATION

.1 Surfaces to receive foam insulation shall be free of oil, grease, dust and debris. Surfaces to be clean, dry and properly fastened to ensure adhesion of the foam to the substrate.

.2 Ensure that all work by other trades that may penetrates through the thermal insulation is in place and complete.

.3 Ensure that surface preparation and any primers required conform to the manufacturers instructions.

3.04 APPLICATION

.1 Clean areas to receive insulation and apply primer. Apply primer in accordance with manufacturer's instructions.

.2 Apply two component foam insulation to primed surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions.

.3 Apply one component low expansion foam in accordance with manufacturers instructions at perimeter of exterior doors, windows, spandrel panels and where indicated in the drawings. Trim off excess extrusion flush with adjacent construction after foam has set.

.4 Spray apply foam insulation in thickness as indicated in the drawings.

.5 Spray application of foam shall be performed in accordance with CAN/ULC-S705.2 and the manufacturers instructions.

.6 Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer and CAN/ULC-S705.2.

.7 Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than 15 mm and not greater than 50 mm.

.8 Do not install spray foam within 75 mm of heat emitting devices such as light fixtures and chimneys.

.9 Finished surface of foam insulation to be free of voids and imbedded foreign objects.

.10 Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.

.11 Trim, as required, any excess thickness that would interfere with the application of cladding system by other trades.

3.05 TOLERANCES

.1 Maximum variation from indicated thickness: minus (-) 6 mm. plus (+) 10 mm.

3.06 CLEANING

.1 Conduct daily cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Leave Work area clean at end of each day.

.3 Upon completion, remove surplus materials, rubbish, tools and equipment. Remove insulation material spilled during installation and leave work area ready for application of wall board.

.4 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction / Demolition Waste Management and Disposal. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

.1 Protect the spray foam from ultraviolet as per manufacturer’s requirements.

.2 Cover the spray foam with an appropriate thermal barrier as detailed.

3.08 SCHEDULE.

.1 Apply one component and two component foam to surfaces of cleaned and prepared surfaces as indicated in the drawings.

.2 Apply foam so that finished face is vertical, plumb flat and in a straight plane.

END OF SECTION