

## 1 GENERAL

### 1.01 REFERENCE STANDARDS

- .1 ASTM International
  - .1 ASTM C 208-12, Standard Specification for Cellulosic Fiber Insulating Board.
  - .2 ASTM C 612-14, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
  - .3 ASTM E 96/E 96M-13, Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-24M-AMEND-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .2 CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.

### 1.02 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for board insulation and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

### 1.03 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect specified materials from nicks, scratches, and

- blemishes.
- .3 Replace defective or damaged materials with new.

- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

## 2 PRODUCTS

### 2.01 INSULATION

- .1 Mineral fibre board: to CAN/ULC-S702 ASTM C 726 ASTM C 612.
  - .1 Type: 1 2 3.
  - .2 Density: 48 72 112 kg/m<sup>3</sup>.
  - .3 Surfaces: unsurfaced asphalt and fibre glass scrim reinforcement and kraft paper kraft paper foil.
  - .4 Thickness: mm as indicated.
  - .5 Size: .
  - .6 Breather membrane for type 2: minimum permeance 300 ng/(Pa.s.m<sup>2</sup>).
  - .7 Vapour barrier for type 3: maximum permeance 60 ng/(Pa.s.m<sup>2</sup>).

### 2.02 ACCESSORIES

- .1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

## 3 EXECUTION

### 3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for board insulation application in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.02 INSTALLATION

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 type A chimneys and CSA B149.1 and CSA B149.2 type B and L vents.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

### 3.03 RIGID INSULATION INSTALLATION

- .1 Imbed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.
- .2 In addition to adhesive, install mineral fibre insulation boards with insulation clips and disk, 2 per 600 x 1200 mm board minimum, fit boards tight, cut off fastener spindle 3 mm beyond disk.
- .3 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

### 3.04 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

**END OF SECTION**

**1 General**

**1.01 INTENT**

- .1 Foam-in-place insulation to exterior metal door frames and window frames.
- .2 Foam-in-place insulation around protrusions through the exterior wall envelope and juncture of different cladding materials.

**1.02 REFERENCES**

- .1 American Society for Testing and Materials (ASTM):
  - .1 ASTM C273-00e1, Standard test method for shear properties of sandwich core materials
  - .2 ASTM D1622-03, Standard test methods for apparent density of rigid cellular plastics
  - .3 ASTM D1621-04, Standard test methods for compressive properties of rigid cellular plastics
  - .4 ASTM D1623-03, Standard test methods for tensile and tensile adhesion properties of rigid cellular plastics
  - .5 ASTM D2842-01, Standard test methods for water absorption of rigid cellular plastics
  - .6 ASTM E96-00e1, Standard test method for water vapour transmission of materials

**1.03 QUALITY ASSURANCE**

- .1 Cooperate and coordinate with the requirements of other units of work specified in other sections.

**1.04 PROJECT CONDITIONS**

- .1 Apply foam-in-place insulation only when substrate and ambient temperatures are within the prescribed limits.
- .2 Ensure that temperature is maintained throughout the curing period.

**2 Products**

**2.01 MATERIALS**

- .1 Insulation: One component rigid urethane foam with the following physical properties:
 

Density (ASTM D1622):	30.3 kg/m <sup>3</sup>
Compressive Strength (ASTM D1621):	57.5 kPa
Compressive Modulus (10% deflection):	848 kPa
Tensile Strength (ASTM D1623):	133.5 kPa
Flatwise Shear (ASTM C273):	58.5 kPa
Thermal Resistance:	1.41 RSI/25 mm thickness
Water Absorption (ASTM D2842):	3.0 kg/H20/m <sup>2</sup>
Water Vapour Transmission (ASTM E96):	2.327 perms

**3 Execution**

**3.01 SURFACE PREPARATION/EXISTING CONDITIONS**

- .1 Clean spaces that are to receive insulation, of dirt, dust, grease, loose material or other foreign matter that may inhibit adhesion.
- .2 Provide sufficient ventilation during and until insulation has cured, to ensure safe working conditions. Introduce fresh air and exhaust air continuously during the 24-hour period after application.
- .3 Protect adjacent surfaces from overspray and dusting.
- .4 Prior to application, slightly moisten surfaces to which foam-in-place insulation is being applied, to accelerate curing.
- .5 Temporarily brace frames as may be required to prevent possible bowing of frames due to over expansion of the foam-in-place insulation.

**3.02 INSTALLATION STEEL DOOR FRAMES**

- .1 Fill exterior hollow metal door frames 75% full with foam-in-place insulation prior to installation of frames. Fill the remainder of the frame after installation, through the gap between the frame and the wall construction.

**3.03 INSTALLATION/AIR SEAL AROUND EXTERIOR WINDOW AND DOOR FRAMES**

- .1 Install foam-in-place insulation around all exterior window frames to maintain continuity of the thermal barrier, after air barrier has been installed and sealed to window frames.
- .2 Ensure that foam completely fills spaces, without voids, and that voids, and that foam is continuous at corners.

**3.04 INSTALLATION/AROUND PROTRUSIONS THROUGH AIR SEAL**

- .1 Install foam-in-place insulation around all protrusions through the exterior building envelope to achieve and maintain continuity of air/vapour seal.

**3.05 CLEAN UP**

- .1 Cut back excess foam-in-place insulation once cured, flush with surrounding surfaces, or recess back for application of sealant as specified in Section 07 92 00.
- .2 Upon completion of foam-in-place insulation work, clean adjacent surfaces of overspray and dusting to the satisfaction of the Consultant.

**END OF SECTION**

**1 GENERAL****1.01 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
  - .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
  - .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
- .2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

**1.02 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit WHMIS MSDS - Material Safety Data Sheets
- .3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Existing Substrate Condition: report deviations, as described in PART 3 - EXAMINATION in writing to Departmental Representative.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures

**1.03 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Applicator: company specializing in performing work of this section.
    - .1 Completed installation must be approved by the material manufacturer.

**1.04 DELIVERY, STORAGE AND HANDLING**

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

- .3 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.

**1.05 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**1.06 AMBIENT CONDITIONS**

- .1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
- .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

**1.07 SEQUENCING**

- .1 Sequence work in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.

**2 PRODUCTS**

**2.01 SHEET MEMBRANE AIR BARRIER – VAPOUR IMPERMEABLE**

- .1 Sheet Seal: Self-Adhesive bitumen laminated to high-density polyethylene film, nominal total thickness of 1.0 mm conforming to the following physical properties:
  - .1 Application min 5°C
  - .2 Service Temperature -40°C to 70°
  - .3 Elongation min 200%
  - .4 Tensile strength min 2.4 Mpa
  - .5 Puncture Resistance min 178 N
  - .6 Water vapour transmission 2.8mg/Pa.s.m<sup>2</sup> (0.05 perms)
  - .7 Moisture Absorption 0.1%
  - .8 Air Leakage at 75 Pa 0.02L/Sm<sup>2</sup>
  - .9 Air Leakage at 3000 Pa No change

**2.02 SHEET MEMBRANE AIR BARRIER – Vapour Permeable**

- .1 Self-adhering reinforced modified polyolefin tri-laminate water resistive, vapour permeable, air barrier membrane conforming to the following properties:
  - .1 Weight: 160 g/m<sup>2</sup>
  - .2 Water Vapour Transmission: 202 g/m<sup>2</sup>
  - .3 Tensile Strength: 182N MD and 129N CD
  - .4 Water Vapour Permeance: 1658 ng/Pa.m2.s
  - .5 Air Leakage: <0.02 L/s/m2
  - .6 Average Dry Breaking Force: 565N MD and 405N CD

**2.03 ACCESSORIES**

- .1 Sealants in accordance with Section 07 92 00.
- .2 Primer: recommended by sealant manufacturer.
- .3 Primer for Vapour Permeable Air Barrier: quick setting, synthetic rubber based adhesive aerosol.

**3 EXECUTION****3.01 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.02 EXAMINATION**

- .1 Verify that surfaces and conditions are ready to accept the Work of this section.
- .2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .3 Report any unsatisfactory conditions to the Departmental Representative in writing.
- .4 Do not start work until deficiencies have been corrected.

**3.03 PREPARATION**

- .1 Remove loose or foreign matter which might impair adhesion of materials.
- .2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure all substrates are free of surface moisture prior to application of membrane and primer.
- .4 Ensure metal closures are free of sharp edges and burrs.

- .5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

### **3.04 INSTALLATION (SHEET MEMBRANE)**

- .1 Install materials in accordance with manufacturer's instructions. Refer to Drawings for locations of non-permeable and vapour permeable membranes.
- .2 Over the properly prepared substrate surface apply primer, as per manufacturer's recommendations, with a roller and allow drying to a tacky surface. Prime only area to be covered in a working day. Re-prime area not covered with membrane within 24 hours.
- .3 After primer has dried, using a hand roller firmly press the entire membrane onto the primed surface, in strict accordance with membrane manufacturer's written instructions.
- .4 Ensure complete coverage of and adhesion of all substrates to receive membrane, including wall penetrations. Co-operate with other trades to ensure continuity of membrane.
- .5 Overlap membrane 50mm and carefully smooth out with a roller to ensure full continuous bond throughout overlaps without fissures or fish mouting.
- .6 It is important that a complete air seal be achieved. Be responsible for the completeness of membrane wherever it is not specifically detailed. Consult with Departmental Representative if there is any doubt as to the integrity of membrane, whether detailed or not.
- .7 In order to ensure a complete seal, seal membrane to all penetrations in an approved manner.
- .8 Apply a trowelled bead of mastic to all terminations of the membrane at the end of a day's work.
- .9 Do not enclose membrane until it has been inspected and approved by Departmental Representative. Inform Departmental Representative two (2) working days prior to required inspection.

### **3.05 PROTECTION OF WORK**

- .1 Do not permit adjacent work to damage work of this section.
- .2 Ensure finished Work is protected from climatic conditions.

### **3.06 INSPECTION**

- .1 Carefully inspect for continuity of air barrier prior to placement of insulation.
- .2 Repair all deficient membrane areas.
- .3 Misaligned or inadequately lapped seams, punctures or other damage must be

repaired with a patch of air barrier membrane extending 50mm in all directions from edge of damaged areas.

- .4 Cover membrane immediately after Departmental Representative's inspection to protect from damage by other trades.

**END OF SECTION**

**1. General****1.1 INTENT**

- .1 intent of this Section is to include requirements for patching and repair of existing roofing membrane damaged due to new construction and renovations to existing building.
- .2 For Bidding Purposes, assumptions have been made as to the type and condition of existing membrane and substrates. If upon further examination, it is determined that the intent of this specification cannot be met, provide Consultant and Owner with written proposal outlining extent of work required and associated costs.

**1.2. APPLICATOR QUALIFICATIONS**

- .1 A single applicator shall perform the work of this Section; and shall be a firm qualified to do such work, employing competent personnel and using adequate plant and equipment to execute the extent of work required.
- .2 A crew of qualified tradesmen shall be defined as follows:
  - .1 A foreman holding a three year Apprenticeship Certificate.
  - .2 A least one other holding a three year Apprenticeship Certificate.
  - .3 The balance of the crew shall have completed some portion of the apprenticeship program and shall have submitted application to the Department of Advanced Education and Manpower for certification as a "Roofer".
  - .4 A Journeyman Certificate is acceptable in lieu of an Apprenticeship Certificate.

**1.3 REGULATORY REQUIREMENTS**

- .1 Comply with all codes and regulations as required by authority having jurisdiction.

**1.4. REFERENCE DOCUMENTS**

- .1 Conform to the requirements of the Canadian Roofing Contractors' Association Ltd. (CRCA) Roofing Specification Manual.
- .2 Notwithstanding the foregoing, where there are differences between this specification and CRCA requirements, this specification shall govern.

**1.5. PRODUCT DELIVERY, STORAGE AND HANDLING**

- .1 Deliver all materials in original, unopened, packaging and containers with manufacturer's labels and seals intact. Ensure manufacturer's name, brand, material mass, specification and lot numbers are indicated on labeling.
- .2 Store materials in ventilated, weatherproof enclosures and protect from all types of moisture. Store roll materials on end.
- .3 Avoid prolonged exposure of light or heat sensitive materials to sunlight.

- .4 Do not store materials on roof in concentrations that exceed design live loads of roof structure.

## 1.6. ENVIRONMENTAL REQUIREMENTS

- .1 Proceed with roofing work only when existing and anticipated weather conditions will allow installation of system without undue interruption.
- .2 Do not proceed with work during rainy or high windy conditions or when such conditions are anticipated.

## 1.7. PROTECTION

- .1 Protect work during all aspects of roofing application. Protect adjacent surfaces from damage by roofing work.
- .2 Where hoisting is necessary, hang tarpaulins or other protective material to protect walls and other building finishes from damage.
- .3 Place plywood runways over roofing work to enable movement of materials and other traffic.
- .4 Locate kettles so that smoke will not discolour building finishes.
- .5 Locate adequate fire extinguishers near kettles being used on or in the building and on roof when torches are being used.

## 1.8. QUALITY ASSURANCE

- .1 Roofing system must be installed by an installer authorized by the membrane manufacturer.
- .2 Roofing system must be inspected and accepted by the membrane manufacturer upon completion of installation, and by an independent inspection company retained by the Owner.

## 2. Products

### 2.1. MATERIALS

- .1 Membrane Base Sheet: combination of polyester and glass fibres to ASTM D6162:
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet.
  - .2 Thickness: 2.2 mm nominal.
  - .3 Reinforcement: minimum 95 g/m<sup>2</sup> glass fleece.
  - .4 Breaking Strength: at -20° C, bend 180 degrees over a mandrel of 30 mm diameter in 5 seconds.
  - .5 Basis of Acceptance: Soprema Elastophene PS.

- .2 Base Sheet Flashing: combination of polyester and glass fibres to ASTM D6162:
  - .1 Type: Elastomeric SBS modified bituminous membrane, both sides covered with thermofusible plastic film.
  - .2 Thickness: minimum 2.8 mm, nominal 3.0 mm.
  - .3 Reinforcement: minimum 180 g/M2 non-woven polyester.
  - .4 Basis of Acceptance: Sopralene Flam 180.
- .3 Membrane Cap Sheet and Cap Sheet Flashing: combination of polyester and glass fibres to ASTM D6162: and as follows:
  - .1 Type: elastomeric SBS modified bituminous membrane containing minimum 12% elastomeric polymers, granular surfaced one side and protected by a thermofusible film on the other.
  - .2 Thickness: minimum 4.0 mm nominal.
  - .3 Reinforcement: minimum 250 g/m2 non-woven polyester.
  - .4 Breaking Strength: at -20° C, bend 180 degrees over a mandrel of 30 mm diameter in 5 seconds, and pass watertightness test in accordance with CGSB 37-GP-56M.
  - .5 Ultimate Elongation: (elongation at break) 45%.
  - .6 Low Temperature Flexibility: at -20° C, bend 90 degrees over a mandrel of 30 mm diameter in 30 seconds and pass watertightness test in accordance with CGSB 37-GP-56M.
  - .7 Basis of Acceptance: Sopralene Flam 250 Granules.
- .4 Vapour Retarder Membrane: Self adhering "peel and stick" air/vapour barrier composed of Styrene-Butadiene-Styrene (SBS) modified bitumen reinforced with high density polyethylene film, anti slip surface, minimum thickness 1.0 mm
- .5 Rigid Insulation:
  - .1 Extruded Polystyrene: to CAN/CGSB 51.20-M87, Type 4, RSI 0.65 per 25 mm thickness, shiplapped edges, total thickness as indicated. Maximum board size 1220 mm x 1220 mm.
  - .2 Overlay Board: 12.7 thick asphalt based recovery board with non-woven glass facers, as recommended by the membrane manufacturer.

- .6 Asphalt: to CSA A123.4-M1979, Type 2 and Type 3.
- .7 Nails: #10 with 25 mm heads to CSA B-111-1974, Table 12, hot dipped galvanized.
- .8 Primer: asphalt based solvent primer conforming to CGSB 37-GP-9M, as recommended by membrane manufacturer.
- .9 Mastic or Sealer: asphaltic based as recommended by membrane manufacturer.
- .10 Tape: asphalt treated kraft paper, fibre reinforced, 100 mm wide, self adhering.

### 3. Execution

#### 3.1 ROOF MEMBRANE TIE-IN PREPARATIONS

- .1 Using a caulk line to identify the membrane tie-in location, mark the surface of the existing SBS membrane a minimum of 300 mm (12") out from the base of the deleted or new roof curb locations.
- .2 At the tie-in locations, prepare the existing SBS membrane by either embedding the granules using a propane torch and trowel or by applying the membrane manufacturers recommended asphalt primer. All SBS membrane tie-in locations shall be a minimum of 300 mm (12") wide.
- .3 Remove and dispose of the existing roof membrane 300 mm (12") from around all deleted roof curbs.
- .4 Upon the removal of the roof curbs, cut back and remove the existing insulation assembly a minimum of 150mm (6") to exposed the existing vapour retarder.
- .5 Prior to the installation of the new roof curbs, cut and removed the existing roof assembly within the new roof curb locations. In-fill any gaps between the existing roof assembly and new roof curb prior to the application of the new self-adhesive base sheet stripping.

#### 3.2 NEW AUXILIARY LEVELLING SURFACE APPLICATION

- .1 At all deleted roof curb openings, supply and install the following onto the new steel decking.
  - .1 Gypsum Sheathing Board: to ASTM C79-95, Standard paper surfacing, minimum 12.5 mm thick. Exterior Standard gypsum board CSA A82.27-M1979 shall be 12.5 mm (½") thick.
- .2 Mechanically fasten gypsum sheathing to the roof deck with a minimum of twenty (20) drywall screws per 1200 mm x 2400 mm (48"x96") sheet. Tape **all new and existing** gypsum board joints.

**3.3 NEW VAPOUR RETARDER APPLICATION**

- .1 Provide a new vapour retarder over the new gypsum board as follows:

**3.4 NEW PRIMARY INSULATION APPLICATION**

- .1 Over the new vapour retarder, supply and install new primary insulation at the deleted roof curb locations as follows:
  - .1 Molded Expanded Polystyrene (MEPS) Board: Thermal Insulation, Polystyrene, Boards and Pipe Covering, Type 1, and as follows:
    - .1 Thermal Conductivity (kSI): 0.036 W/m°C maximum (R-3.75 / 25 mm).
    - .2 Board Size, Nominal: 1200 mm x 1200 mm.
    - .3 Dimensional Stability: 0.3% max. linear change.
    - .4 Certification: third party, in accordance with CGSB, ULC, or other certification programs accredited by the Standards Council of Canada
  - .2 Provide insulation for single layer installation. Should multiple layers be required, adhere the insulation panels with either cold asphalt or manufactures recommended adhesive. Match the thickness of the existing insulation panels.
  - .3 Ensure full adhesion. Fill insulation joints over 10 mm wide with insulation.

**3.5 NEW SECONDARY INSULATION APPLICATION**

- .1 The following **two (2) options** can be chosen as substrate for mop application over the in-fill primary insulation:
  - .1 Ship-lap Edge Asphalt-Coated Wood Fibreboard: IKO Industries Ltd. 25 mm thick, to CRCA manual, Type 1, (R-2.8), offset edges (Single Layer).
  - .2 Squared Edge Asphalt-Coated Wood Fibreboard: Knight-Celotex or IKO Industries Ltd., ASTM C208 / C209 / C165, 11 mm thick, to CRCA manual and CSA A247-M1978, Type 1, (R-1.4), offset edges (Double Layer).

**3.6 NEW MEMBRANE INSTALLATION (GENERAL)**

- .1 Install membrane components in accordance with requirements of membrane manufacturer.
- .2 Use installation method as indicated on Primary Membrane Schedule.
- .3 Torch apply sheet materials for continuous fusion of cap sheets and adhesion to non-combustible substrates.
- .4 Butter all side and end lap seams with torch heat application on all field base sheet and self-adhering base sheet stripping locations. All field base sheet membrane shall overlap the existing granular cap sheet membrane tie-in a minimum of 150 mm (6").

- .5 Limit cap sheet bleed-out at seams to 12 mm. Ensure that a new field granular cap sheet membrane extend a minimum of 150 mm (6") past the edge of the new field base sheet. A minimum of 300 mm (12") membrane tie-in is required. Cover excessive bleed-out and replace missing mineral surfacing by embedding matching colour granules.
  
- .6 Primary membrane deficiencies shall include, but not be limited to, ridges, tenting, buckles, wrinkles and voids.

**END OF SECTION**

## 1 GENERAL

### 1.01 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 National Research Council Canada (NRC)
  - .1 National Building Code of Canada (NBC).
- .3 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-S115 Fire Tests of Fire stop Systems.

### 1.02 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1(1) and 9.10.9.6(1)): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
  - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

### 1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
- .3 Shop Drawings:
  - .1 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation.
  - .2 Construction details should accurately reflect actual job conditions.

- .4 Samples:
  - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
  
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures
  - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

#### 1.04 QUALITY ASSURANCE

- .1 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .2 Twice during progress of Work at 25% and 60% complete.
  - .3 Upon completion of Work, after cleaning is carried out.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
  - .2 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .3 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .4 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
  
- .2 Storage and Protection:
  - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
  
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

## **2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

## **3 EXECUTION**

### **3.01 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.02 PREPARATION**

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to

manufacturer's instructions.

- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

### 3.03 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

### 3.04 SPECIAL REQUIREMENTS

- .1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:
  - .1 Non dust generation: at location.
  - .2 Movement: % .
  - .3 Designed for re-entry, removable at: location.
  - .4 rating except at location.

### 3.05 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
  - .1 Ensure pipe insulation installation precedes fire stopping.

### 3.06 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### 3.07 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

### 3.08 SCHEDULE

- .1 Fire stop and smoke seal at:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Edge of floor slabs at curtain wall and precast concrete panels.
  - .3 Top of fire-resistance rated masonry and gypsum board partitions.
  - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
  - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
  - .7 Openings and sleeves installed for future use through fire separations.
  - .8 Around mechanical and electrical assemblies penetrating fire separations.
  - .9 Rigid ducts: greater than 129 cm<sup>2</sup> : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

**END OF SECTION**

**1 GENERAL****1.01 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
  - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
  - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
  - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
  - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.02 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Manufacturer's product to describe:
    - .1 Caulking compound.
    - .2 Primers.
    - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
  - .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 Manufacturer's Instructions:
  - .1 Submit instructions to include installation instructions for each product used.

**1.03 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

**1.04 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

**1.05 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Proceed with installation of joint sealants only when:
    - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
    - .2 Joint substrates are dry.
    - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
  - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

**1.06 ENVIRONMENTAL REQUIREMENTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

- .2 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants.

## 2 PRODUCTS

### 2.01 SEALANT MATERIAL DESIGNATIONS

- .1 Sealant: Polysulphide base, one (1) component, to CAN/CGSB-19.13-M87, Shore A hardness 15-2.
- .2 Sealant: Acrylic Base, one (1) component to CGSB [CAN/CGSB-19.17-M90 emulsion base, Shore A hardness 15 – 25.
- .3 Sealant: Silicone base, one (1) component to CAN/CGSB-19.13-M87 colour, Shore A hardness 15-25.
- .4 Pick Resistant Sealant: 100% solids epoxy gel; Sika Everset Type II
- .5 Joint Back-Up: Round closed cell foam, neoprene, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant.
- .6 Joint Cleaner: Non corrosive solvent recommended by sealant manufacturer for applicable substrate material.
- .7 Primer: Non-staining type recommended by sealant manufacturer

### 2.02 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

## 3 EXECUTION

### 3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### 3.02 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil

grease, and other matter which may impair Work.

- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

### 3.03 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

### 3.04 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

### 3.05 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

### 3.06 APPLICATION

- .1 Sealant:
  - .1 Apply sealant in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.

### 3.07 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

- .1 Leave Work area clean at end of each day.
  - .2 Clean adjacent surfaces immediately.
  - .3 Remove excess and droppings, using recommended cleaners as work progresses.
  - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### 3.08 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

### 3.09 SEALANT SCHEDULE

- .1 Where no specified type of sealant is shown or specified choose one of the sealants specified in this Section appropriate for its location.
- .2 Make sealant selections consistent with manufacturer's recommendations.
- .3 Use acrylic sealant on interior locations where little or no movement can occur.
- .4 Use mould and mildew resistant silicone sealant for nonmoving joints in washrooms and kitchens. Do not use on floors.
- .5 Use pick resistant sealant in cell areas and other areas accessible to prisoners and as indicated on Drawings

**END OF SECTION**