

## 1. GENERAL

### 1.1. RELATED REQUIREMENTS

- .1 Section 07 21 29 – Sprayed Insulation
- .2 Section 07 26 00 – Vapour Retarders
- .3 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier

### 1.2. REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 208-[95(2001)], Specification for Cellulosic Fiber Insulating Board.
  - .2 ASTM E 96/E 96M-[05], Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-24M-[77(R1983)], Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

### 1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

## 2. PRODUCTS

### 2.1. BOARD INSULATION –EXTERIOR WALLS

- .1 Extruded polystyrene (XPS): to CAN/ULC-S701.
  - .1 Type: 3. Rigid closed cell type w/high density skin.
  - .2 Compressive strength: min 30.0 psi.
  - .3 Thermal Resistance: R5.0 per inch.
  - .4 Water Absorption: 0.3 % by volume maximum.
  - .5 Thickness: as indicated.
  - .6 Size: 24" x 96".
  - .7 Edges: square
  - .8 Flame/Smoke Properties: in accordance with CAN/ULC-S102.

### 2.2. BOARD INSULATION –FOUNDATION, GRADE BEAM

- .1 Concrete faced extruded polystyrene (XPS): to CAN/ULC-S701.
- .2 Manufacturer: Tech-Crete CFI panels
  - .1 Type: 4. Rigid closed cell type w/high density skin.

- .2 Compressive strength: min 30.0 psi.
- .3 Thermal Resistance: R5.0 per inch.
- .4 Water Absorption: 0.3 % by volume maximum.
- .5 Thickness: as indicated.
- .6 Size: 24" x 48".
- .7 Edges: t&g on 48", square on 24".
- .8 Flame/Smoke Properties: in accordance with CAN/ULC-S102.

**2.3. BOARD INSULATION –FOUNDATION, UNDER SLAB AND CRAWLSPACE**

- .1 Extruded polystyrene (XPS): to CAN/ULC-S701.
  - .1 Type: 4. Rigid closed cell type w/high density skin.
  - .2 Compressive strength: min 30.0 psi.
  - .3 Thermal Resistance: R5.0 per inch.
  - .4 Water Absorption: 0.3 % by volume maximum.
  - .5 Thickness: as indicated.
  - .6 Size: 24" x 96".
  - .7 Edges: square
  - .8 Flame/Smoke Properties: in accordance with CAN/ULC-S102.

**2.4. BOARD INSULATION –ROOF**

Roof Types R1, applied to top side of roof deck

- .1 Expanded polystyrene (EPS): to CAN/ULC-S701.
  - .1 Type: 1.
  - .2 Compressive strength: min 30.0 psi.
  - .3 Thermal Resistance: R4.0 per inch.
  - .4 Water Absorption: 0.3 % by volume maximum.
  - .5 Thickness: as indicated, tapered to provide slope, joints sealed
  - .6 Size: 24" x 96".
  - .7 Edges: square.
  - .8 Flame/Smoke Properties: in accordance with CAN/ULC-S102.

Roof Types R1, applied to top of sloped insulation

- .2 Closed cell polyisocyanurate foam to CAN/ULC-S770.
  - .1 Type: 2.
  - .2 Compressive strength: min 20.0 psi.
  - .3 Thermal Resistance: R6.0 per inch.
  - .4 Water Absorption: 0.3 % by volume maximum.
  - .5 Thickness: as indicated
  - .6 Size: 24" x 96".
  - .7 Edges: square.
  - .8 Flame/Smoke Properties: in accordance with CAN/ULC-S126.

**2.5. ADHESIVE**

- .1 Type indicated by insulation manufacturer for application.

**2.6. ACCESSORIES**

- .1 Thermofused Membrane Air/Vapour Barrier: Specified in Section 07 46 13.
- .2 Furring angle and block shear connector @ 16" o/c.
- .3 Insulation Fasteners: Impaling clip of galvanized steel with washer retainer, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

### **3. EXECUTION**

#### **3.1. MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

#### **3.2. WORKMANSHIP**

- .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 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.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Contract Administrator.

#### **3.3. EXAMINATION**

- .1 Examine substrates and immediately inform Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure:
  - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

#### **3.4. PERIMETER FOUNDATION INSULATION**

- .1 Install rigid insulation on concrete foundation walls and concrete grade beams using H40 Hilti gun X-1E 6 –50min D152 washer/ fastener spaced 600mm (24") vertically and horizontally or with purpose made multi-clinch metal strip c/w Gripcon® nail. Set metal strip flush into cut rigid insulation at 600mm (24") spacing.
- .2 Install boards on foundation wall and grade beam perimeter, as best suited to maintain thermal continuity.
  - .1 Places boards in a method to maximize contact bedding.
  - .2 Stagger side/end joints.
  - .3 Butt edges and ends tight to adjacent board and to protrusions.
- .3 Extend boards over control joints, unbonded to foundation 8" on one side of joint.
- .4 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

#### **3.5. EXTERIOR WALL INSULATION**

- .1 Adhere a 12" wide strip of polyethylene sheet over construction joints with double beads of adhesive each side of joint.
  - .1 Tape and seal joints.
  - .2 Extend sheet full height of joint
- .2 Apply adhesive in three continuous beads per board length.
- .3 Install boards on wall surface, vertically. Place membrane surface of insulation against adhesive.
  - .1 Places boards in a method to maximize contact bedding.
  - .2 Stagger side/end joints.
  - .3 Butt edges and ends tight to adjacent board and to protrusions.
  - .4 Tape insulation board joints.
- .4 Extend boards over control joints, unbonded to foundation 8" on one side of joint.
- .5 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

**3.6. ROOF INSTALLATION**

- .1 Confirm with roofing manufacturer's instructions.

**3.7. FIELD QUALITY CONTROL**

- .1 Comply with the requirements of Section (01 45 00 – Quality Control)
- .2 All work to be inspected by a qualified testing agency upon completion of work.

**3.8. CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## **1. GENERAL**

### **1.1. RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 26 00 – Vapour Retarders
- .3 Section 07 46 13 Thermofused Membrane Air/Vapour Barrier
- .4 Section 07 84 00 – Firestopping
- .5 Section 09 22 16 – Non-Structural Metal Framing

### **1.2. REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 423-[02a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - .2 ASTM C 518-[04], Standard Test Method for Steady-State Flux Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - .3 ASTM E 605-[93(2000)], Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-[03], Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S703-[01], Standard for Cellulose Fibre Insulation (CFI) for Buildings.

### **1.3. ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

### **1.4. COORDINATION**

- .1 Section 01 31 00: Project Management and Coordination
- .2 Coordinate the work with Section 07 26 00 for installation of vapour retarder.

### **1.5. QUALITY ASSURANCE**

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
  - .1 Verify project requirements.
  - .2 Review installation conditions.
  - .3 Review manufacturer's instructions and warranty requirements.

### **1.6. SITE CONDITIONS**

- .1 Site Environmental Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

## **2. PRODUCTS**

### **2.1. MATERIALS**

- .1 Insulation: Spray Polyurethane Foam: Two-component spray polyurethane cellular plastic foam, complying with the following methods and meeting the following physical properties: Cellulose fibre insulation: to CAN/ULC-S703.
- .2 R-value: 5.6 per inch minimum to ASTM C518.
- .3 Density: as per manufacturer according to ASTM D1622..
- .4 Surface burning characteristics: to CAN/ULC-S102.
  - .1 Flame spread: FSC 25.
  - .2 Smoke density developed: SD50.
- .2 Adhesive: as recommended by insulation manufacturer.

## **3. EXECUTION**

### **3.1. MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

### **3.2. PREPARATION**

- .1 Protection:
  - .1 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
  - .2 Protect adjacent surfaces and equipment from damage by over spray, fall-out, and dusting of insulation materials.

### **3.3. APPLICATION**

- .1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
- .2 Apply insulation to clean dry surfaces.
- .3 Apply primer as recommended by manufacturer.

### **3.4. CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## 1. GENERAL

### 1.1. RELATED REQUIREMENTS

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 21 29 – Sprayed Insulation
- .3 Section 07 46 13 Thermofused Membrane Air/Vapour Barrier
- .4 Section 07 84 00 – Firestopping
- .5 Section 07 92 00 – Joint Sealants
- .6 Section 08 11 00 – Metal Doors & Frames
- .7 Section 08 44 23 – Structural Sealant Glazed Curtain Walls

### 1.2. REFERENCES

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.33-[M89], Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
  - .2 CAN/CGSB-51.34-[M86], Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).

### 1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

### 1.4. COORDINATION

- .1 Section 01 31 00: Project Management and Coordination
- .2 Coordinate the work with Section 07 21 13/29 for installation of insulation.

## 2. PRODUCTS

### 2.1. SHEET VAPOUR BARRIER

- .1 Fire Retardant Reinforced Vapor Barrier: Griffolyn Type-90 FR Natural.
  - .1 Fire retardant 5-ply laminate, combining 3-layers of fire retardant linear low density polyethylene and 2 high-strength non-woven cord grids.
  - .2 Weight, ASTM D 3776: 69 lb/1,000 Ft<sup>2</sup> (34.2 kg/100m<sup>2</sup>)
  - .3 Puncture Propagation Tear, ASTM D 2582: 45 lb. (1608 N)
  - .4 Permeance (Perm), ASTM E 96: 0.028 grains/hr-ft<sup>2</sup>-in Hg (1.61 ng/(Pa-s-m<sup>2</sup>))
  - .5 Drop Dart, ASTM D 1709: 2400 g.
  - .6 Tensile Strength, ASTM D 4833: 54 lb (209 N)
  - .7 Surface Buring Characteristics: NFPA 701, Large Scale: Pass. ASTM E 84, Class I, Class B flame spread rating. Flame spread 5, smoke developed 135.
  - .8 Usable Temperature Range: -40 to 170 degrees F (-40 to 77 degrees C).
- .2 Polyethylene film under slab: to CAN/CGSB-51.34, (10 mil) 0.25mm thick with a water vapour permeance of not greater than 45 ng/(P·s·m<sup>2</sup>), flame spread rating of less than 150 to CAN/ULC S102.

## **2.2. ACCESSORIES**

- .1 General: Ensure accessories are from same manufacturer as vapor retarders.
- .2 Mastic Tape: Griffolyn Fab Tape. RI Part No. 60-0002
  - .1 Black, double-sided, asphaltic, pressure-sensitive, mastic tape.
  - .2 Weight: 3.75 lbs/100 ft. (1.7kg/30m)
  - .3 Thickness: 35 mils (0.9mm)
  - .4 3 Inch Seam Shear: 35 lbs. (156N)
- .3 Self-Adhesive Tape: Griffolyn White Sealant Tape. RI Part No. 60-0153
  - .1 Reinforced white backing with gray adhesive.
  - .2 Weight: 3.0 lbs for 4" x 50' roll
  - .3 Thickness: 26 mils (0.65mm)
  - .4 3 Inch Seam Shear: 30 lbs. (134N)
- .4 Fire Retardant Self-Adhesive Tape: Griff Tape FR RI Part No. 60-0151
  - .1 White backed adhesive tape.
  - .2 Weight: 3.75 lbs for 4" x 180' roll
  - .3 Thickness: 5 mils (0.125mm)
  - .4 Adhesion to Steel: 66 oz/in (18 N/in)
- .5 Griffolyn pipe boots, factory-fabricated.
- .6 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.
- .7 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer. To Section 07 92 00 - Joint Sealants.
- .8 Staples: minimum 6 mm leg.
- .9 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

## **3. EXECUTION**

### **3.1. INSTALLATION**

- .1 Install reinforced vapor retarders in accordance with manufacturer's instructions.
- .2 Ensure services are installed and inspected prior to installation of retarder.
- .3 Install sheet vapour retarder on warm side of exterior wall, ceiling and floor assemblies prior to installation of gypsum board to form continuous retarder.
- .4 Use sheets of largest practical size to minimize joints.
- .5 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

### **3.2. EXTERIOR SURFACE OPENINGS**

- .1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

### **3.3. PERIMETER SEALS**

- .1 Seal perimeter of sheet vapour barrier as follows:
  - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
  - .2 Lap sheet over sealant and press into sealant bead.
  - .3 Install staples through lapped sheets at sealant bead into wood substrate.
  - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

### **3.4. LAP JOINT SEALS**

- .1 Seal lap joints of sheet vapour barrier as follows:

- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
- .4 Install staples through lapped sheets at sealant bead into wood substrate.
- .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

**3.5. ELECTRICAL BOXES**

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
  - .1 Install moulded box vapour barrier.
  - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

**3.6. FIELD QUALITY CONTROL**

- .1 Comply with the requirements of Section (01 45 00 – Quality Control)
- .2 All work to be inspected by a qualified testing agency upon completion of work.

**3.7. CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

**1. GENERAL**

**1.1. RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 26 00 – Vapour Retarders
- .3 Section 07 62 00 – Sheet Metal Flashings & Trim
- .4 Section 07 84 00 – Firestopping
- .5 Section 09 22 16 – Non-Structural Metal Framing

**1.2. REFERENCES**

- .1 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-37.2-[M88], Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
  - .2 CAN/CGSB 37.3-[M89], Application of Emulsified Asphalts for Dampproofing or Waterproofing.
  - .3 CAN/CGSB 37.5-[M89], Cutback Asphalt Plastic Cement.
  - .4 CGSB 37-GP-6Ma-[83], Asphalt, Cutback, Unfilled, for Dampproofing.
  - .5 CGSB 37-GP-9Ma-[83], Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  - .6 CGSB 37-GP-11M-[76(R1984)], Application of Cutback Asphalt Plastic Cement.
  - .7 CGSB 37-GP-12Ma-[84], Application of Unfilled Cutback Asphalt for Dampproofing.
  - .8 CGSB 37-GP-15M-[76(R1984)], Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
  - .9 CAN/CGSB 37.16-[M89], Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
  - .10 CAN/CGSB 37.28-[M89], Reinforced Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and for Waterproofing.
  - .11 CGSB 37-GP-36M-[76], Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
  - .12 CGSB 37-GP-37M-[77], Application of Hot Asphalt for Dampproofing or Waterproofing.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA A123.4-[98], Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
- .4 Health Canada
  - .1 Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
- .5 National Research Council Canada (NRC)/Institute for Research in Construction (IRC)
  - .1 Canadian Construction Materials Centre (CCMC)

**1.3. PRODUCT DATA**

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data sheets for bituminous dampproofing products. Including:
  - .1 Product characteristics.
  - .2 Performance criteria.
  - .3 Application methods.

- .4 Limitations.
- .3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.
- .4 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

#### **1.4. DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product. Provide and maintain dry, off-ground weatherproof storage.
- .2 Cold applied elastomeric membrane should be stored in closed containers outdoors.
- .3 Store membrane at temperature of 5 degrees C (40 degrees F) and above to facilitate handling
- .4 Membrane contain petroleum solvents and are flammable. Do not use near open flame
- .5 Store role materials horizontally in original packaging.
- .6 Store adhesives and primers at temperatures of 5 degrees C and above to facilitate handling
- .7 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Section 01 35 20 LEED Sustainable Requirements and 01 74 19 Waste Management and Disposal.

#### **1.5. ENVIRONMENT**

- .1 No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.
- .2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

#### **1.6. QUALITY ASSURANCE**

- .1 Submit in writing a document stating that the applicator of the primary air/vapour barrier membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.
- .2 Perform Work in accordance with the manufacturer's written instructions of the air/vapiy membrane and this specification.
- .3 Maintain one copy of manufacturer's written instructions on site.
- .4 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air/vapour barrier membrane manufacturer's representative.
- .5 Components used in this section shall be sourced from one manufacturer, including sheet membrane, air/vapour barrier sealants, primers, mastics and adhesives.
- .6 Mockup:
  - .1 Provide mockup of air/vapour barrier materials under this section.
  - .2 Where directed by Contract Administrator, construct typical exterior wall section 2m x 2m incorporating substrate, window frame, attachment of insulation and showing air/vapour barrier membrane application details.
  - .3 Allow 48hr for inspection of mockup by Contract Administrator before proceeding with Work. Mockup may remain as part of the Work.

### **2. PRODUCTS**

#### **2.1. MEMBRANES**

- .1 Primary sheet air/vapour barrier shall be Henry-Bakor Blueskin TG, SBS modified bitumen, reinforced thermofusible membrane having the following physical properties:
  - .1 Thickness: 2.5mm (100 mils) min.
  - .2 Air Leakage: 0.000 L/s.m<sup>2</sup> @75 Pa

- .3 Vapour Permeance:  $0.2 \text{ ng/Pa.s.m}^2$  to ASTM E96
- .4 Low temperature flexibility:  $-15^\circ\text{C}$  to CGSB 37-GP-56M
- .5 Elongation: 40% md, 40% xd
- .2 Self-adhered air/vapour barrier transition membrane shall be Blueskin SA manufactured by Henry-Bakor, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, and having the following physical properties:
  - .1 Thickness: 1.0 mm (40 mils) min.
  - .2 Air leakage:  $<0.01 \text{ L/s.m}^2$  @ 75 Pa to ASTM E283-91,
  - .3 Vapour permeance:  $1.6 \text{ ng/Pa.m}^2.\text{s}$  (0.03 perms) to ASTM E96,
  - .4 Low temperature flexibility:  $-30^\circ\text{C}$  to CGSB 37-GP-56M,
  - .5 Elongation: 200% to ASTM D412-modified.
- .3 Through-wall flashing membrane and dampproof course (Self-Adhering) shall be Blueskin TWF manufactured by Henry-Bakor, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, having the following physical properties:
  - .1 Colour: Yellow,
  - .2 High Temperature Stability:  $110^\circ\text{C}$  min. to ASTM D5147 (resistance to flow),
  - .3 Thickness: 1.0 mm (40 mils),
  - .4 Air leakage:  $<0.005 \text{ L/s.m}^2$  @ 75 Pa to ASTM E283-91,
  - .5 Water vapour permeance:  $1.6 \text{ ng/Pa.m}^2.\text{s}$  (0.03 perms) to ASTM E96,
  - .6 Low temperature flexibility:  $-30^\circ\text{C}$  to CGSB 37-GP-56M.

## 2.2. PRIMERS

- .1 Sheet membrane primer shall be 930-18 Poly-Tac manufactured by Henry-Bakor, a polymer modified primer having the following physical properties:
  - .1 Colour: Blue,
  - .2 Weight: 0.9 kg/l,
  - .3 Solids by weight: 30%,
  - .4 Application temp: no limit.
- .2 Primer for self-adhering membranes at temperatures above -12°C shall be Blueskin LVC manufactured by Henry-Bakor, a synthetic rubber based adhesive type, quick setting, having the following physical properties:
  - .1 Colour: Blue,
  - .2 VOC: <240g/L
  - .3 Solids by weight: 40%,
  - .4 Drying time (initial set): 30 minutes.
- .3 Primer for self-adhering membranes at temperatures above -4°C shall be Aquatec Primer manufactured by Henry-Bakor, a polymer emulsion based adhesive type, quick setting, having the following physical properties:
  - .1 Colour: Aqua,
  - .2 Weight: 1.0 kg/l,
  - .3 Solids by weight: 35%,
  - .4 Water based, no solvent solutions,
  - .5 Drying time (initial set): 30 minutes at 50% relative humidity and 20°C.

### **2.3. MASTICS AND TERMINATION SEALANT**

- .1 Liquid air seal mastic and insulation adhesive shall be Air-Bloc 21 or 230-21 Insulation Adhesive manufactured by Henry - Bakor, a synthetic, trowel applied, rubber based adhesive type, having the following characteristics:
  - .1 Compatibility: With air/vapour barrier membrane, substrate and insulation.
  - .2 Air leakage: 0.013 L/s.m<sup>2</sup> @ 100 Pa.,
  - .3 Water vapour permeance: 1.7 ng/Pa.m<sup>2</sup>.s. (0.03 perms),
  - .4 Long term flexibility: CGSB 71-GP-24M,
  - .5 Chemical resistance: Alkalis and salt.
- .2 Termination Sealant shall be HE925 BES Sealant manufactured by Henry - Bakor, a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:
  - .1 Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
  - .2 Complies with Fed. Spec. TT-S-00230C, Type II, Class A,
  - .3 Complies with ASTM C 920, Type S, Grade NS, Class 25,
  - .4 Elongation: 450 – 550%,
  - .5 Remains flexible with aging,
  - .6 Seals construction joints up to 1 inch wide.
- .3 Termination Sealant shall be POLYBITUME® 570-05 Polymer Modified Sealing Compound manufactured by Henry - Bakor, a polymer modified sealing compound having the following characteristics:
  - .1 Compatible with sheet waterproofing membrane and substrate.
  - .2 Solids by volume: 70%,
  - .3 Vapour permeance: 2.9 ng/Pa.m<sup>2</sup>.s, ASTM E96,
  - .4 Complies with CGSB 37.29,
  - .5 Remains flexible with ageing,
  - .6 Adheres to wet surfaces,
  - .7 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions.

### **3. EXECUTION**

#### **3.1. EXAMINATION**

- .1 Verify that surfaces and conditions are ready to accept the Work of this section. Notify Contract Administrator in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

#### **3.2. PREPARATION**

- .1 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar, frost or other contaminants. Fill spalled areas in substrate to provide an even plane. Strike masonry joints flush.
- .2 New concrete should be cured for a minimum of 14 days and must be dry before air/vapour barrier membranes are applied.
- .3 Use appropriate membrane primer as recommended by manufacturer based on air and surface temperature at time of application

#### **3.3. PRIMER**

- .1 Apply primer to poured concrete, metal and glass-faced wallboard substrates at rate recommended by manufacturer.
- .2 Allow primer to dry prior to application of membrane.

#### **3.4. AIR VAPOUR BARRIER MEMBRANE**

- .1 Apply air vapour barrier membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger vertical joints.
- .2 Position air vapour barrier membrane for alignment and apply heat to the underside of the membrane by propane torch at the point of contact with the substrate.
- .3 Apply sufficient heat to make bitumen tacky and firmly press membrane onto substrate to ensure complete contact and bond for the full extent of the membrane.
- .4 Overlap sides and ends a minimum of 50 mm and use a heated trowel to fully seal laps.
- .5 Tie-in to window frames, doorframes and at the interface of dissimilar materials as indicated in drawings.
- .6 Ensure all projections including wall ties, are properly sealed by using a heated trowel to butter compound at the interface.
- .7 Air/vapour barrier membrane to be complete and continuous from the wall to the roofing membrane system and waterproofing membrane system, around windows, aluminium screens, hollow metal door frames and spandrel panels.
- .8 Mechanically fasten membrane through securement bars to all window, door, louvers and curtain wall sections as recommended by membrane manufacturer where proper adhesion and bonding cannot be maintained.
- .9 Membrane applied to the underside of substrate surfaces shall receive special attention on application to ensure maximum surface area adhesion is obtained.

#### **3.5. THROUGH-WALL FLASHING & DAMPPROOF COURSE**

- .1 Where through-wall flashing & dampproof course are indicated on drawings install primary air/vapour barrier membrane in accordance with manufacturer's written instructions.
- .2 Apply through-wall flashing and dampproof coursing membrane in accordance with CSA A371-94 Masonry Construction for Buildings; along the base of masonry veneer walls, over windows, doors and other wall openings required to be protected.
- .3 Applications shall form a continuous flashing membrane and shall extend up a minimum of 200 mm up the back-up wall.
- .4 At the end of each days work seal the top edge of the membrane where it meets the substrate

using liquid air seal mastic. Trowel apply a feathered edge to seal termination and shed water.

- .5 Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry veneer. At locations where flashing terminates or intersects wall openings including door frames, “end dam” flashing to protect openings and redirect water out. Trim off excess as directed by the Contract Administrator.
- .6 Apply dampproof coursing membrane over slabs on grade, prepare and prime surfaces, align and position membrane between slab and masonry block work.
- .7 Align and position the leading edge of self-adhering through-wall flashing membrane with the front horizontal edge of the foundation walls, self angles and other substrates to be protected, partially remove protective film and roll membrane over surface and up vertically.
- .8 Press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll all laps and membrane to affect the seal.
- .9 Ensure all preparatory work is complete prior to applying self-adhering through-wall flashing membrane.
- .10 Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry veneer. Trim off excess as directed by the Contract Administrator.

### **3.6. SELF-ADHERED TRANSITION MEMBRANE**

- .1 Align and position self-adhered transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps.
- .2 Tie-in to window frames, aluminium screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings
- .3 Promptly roll all laps and membrane with a counter top roller to effect seal.
- .4 Ensure all preparatory work is complete prior to applying primary air vapour barrier membrane.

### **3.7. INSPECTION**

- .1 Notify Contract Administrator when sections of work are complete so as to allow for review prior to installing insulation.

### **3.8. INSTALLATION OF INSULATION**

- .1 Upon the completion of the air/vapour barrier membrane system apply the liquid air seal mastic and insulation adhesive in a serpentine pattern.
- .2 Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.
- .3 Fully butter all joints of insulation panels with adhesive during installation, except at expansion joints.

### **3.9. PROTECTION OF FINISHED WORK**

- .1 Blueskin membranes are not designed for permanent exposure. Product designed to withstand job site exposure for up to six weeks, however good practice calls for covering as soon as possible.

### **3.10. FIELD QUALITY CONTROL**

- .1 Comply with the requirements of Section (01 45 00 – Quality Control)
- .2 All work to be inspected by a qualified testing agency upon completion of work.

### **3.11. CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## **1. GENERAL**

### **1.1. RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 21 29 – Sprayed Insulation
- .3 Section 07 26 00 – Vapour Retarders
- .4 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .5 Section 07 62 00 – Sheet Metal Flashings & Trim
- .6 Section 07 84 00 – Firestopping
- .7 Section 07 92 00 – Joint Sealants
- .8 Section 08 11 00 – Metal Doors & Frames
- .9 Section 08 44 23 – Structural Sealant Glazed Curtain Walls

### **1.2. REFERENCES**

- .1 Specification American Society for Testing and Materials (ASTM):
  - .1 ASTM A1008/A1008M, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability
  - .2 ASTM E2178-11, Standard Test Method for Air Permeance of Building Materials
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 Canadian Sheet Steel Building Institute (CSSBI)
  - .1 CSSBI 20M, Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications
- .4 Canadian Standards Association (CSA International)
  - .1 CSA S136, Cold Formed Steel Structural Members
- .5 Underwriter Laboratories of Canada (ULC):
  - .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies
  - .2 CAN/ULC-S114-05, Standard Method of Test for Determination of Non-combustibility in Building Materials
  - .3 CAN/ULC-S134-92, Fire Test for Exterior Wall Assemblies
  - .4 CAN/ULC-S135-04, Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), Includes Amendment 1

### **1.3. ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination: Coordinate the Work of this Section with the installation of gypsum sheathing board and air barrier; Sequence work so that installation of aluminum panels and support framing coincides with installation of substrate preparation without causing delay to the Work.
- .2 Pre-Construction Conference: Arrange a site meeting attended by the Contractor, the Subcontractor, the Contract Administrator, materials supplier(s), and other relevant personal before commencement of work for this Section; as indicated in Section 01 31 19 Project Meetings.
  - .1 Review methods and procedures related to installation, including manufacturer's written instructions;
  - .2 Examine substrate conditions for compliance with manufacturers installation requirements;
  - .3 Review temporary protection measures required during and after installation

#### 1.4. SUBMITTALS

- .1 Provide requested information in accordance with Section 01 33 00 Submittals Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
  - .1 Shop Drawings: Submit shop drawings of panel systems, components, façade material, panel layout and accessories to the Contract Administrator for review.
  - .2 Samples:
    - .1 Submit full size samples of accessories as requested by Contract Administrator.
  - .3 Manufacturers Warranties: Submit copies of manufacturers warranties.
  - .4 Operation and Maintenance Data: Submit manufacturer's written instructions for cleaning solutions, materials and procedures, include name of original installer and contact information in accordance with Section 01 78 00 Closeout Submittals.
    - .1 Provide specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

#### 1.5. QUALITY ASSURANCE

- .1 Qualifications: Provide proof of qualifications when requested by Contract Administrator:
  - .1 Manufacturer / Supplier: Obtain materials from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties.
  - .2 Installers: Execute Work of this Section using qualified personnel skilled in installation of work of this Section, having a minimum of five (5) years proven experience of installations similar in material, design, and extent to that indicated for this Project.

#### 1.6. MOCK-UPS

- .1 Mock-ups: Construct mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution in accordance with Section 01 45 00 Quality Control for mock-ups and as follows:
  - .1 Build mock-up of typical wall section, incorporating the panel and finish, support framing and anchoring, breathable membrane, substrate materials, and adjacent materials including flashing, doors, windows and trim.
- .2 Notify Contract Administrator a minimum seven days prior to mock-up construction.
- .3 Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Contract Administrator specifically notes such deviations in writing.
- .4 Once reviewed by Contract Administrator, acceptable mock-up can form a permanent part of the Work, and will form the basis for acceptance for the remainder of the project.
- .5 Remove and replace materials found not acceptable at no cost to Owner or Contract Administrator.

#### 1.7. DELIVERY, STORAGE AND HANDLING

- .1 Delivery: At the time of delivery, visually inspect all materials for damage. Note any damaged to materials on the receiving ticket and immediately report to the shipping company and the material manufacturer.
  - .1 Remove damaged materials from the site immediately.
- .2 Storage: Store materials in accordance with manufacturer's written instructions, raised off the ground and cover with a weather proof flame resistant sheeting or tarpaulin.

- .3 Handling: Material shall be handled in accordance with sound material handling practices and in accordance with manufacturer's written instructions.

#### **1.8. SITE CONDITIONS**

- .1 Site Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings where panels are indicated to fit walls and other construction.
- .2 Establish dimensions and proceed with fabricating panels where field measurements cannot be made without delaying the work; allow for site trimming and fitting.
- .3 Ambient Conditions: Install materials outlined in this Section after completion of work by other Sections is complete, and all penetrations are watertight; to provide adequate dry, clean, level, and plumb surfaces for installation and adhesion.

#### **1.9. WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

### **2. PRODUCTS**

#### **2.1. LOCAL SUPPLIER**

- .1 Metal Depot Ltd., 1-214 DaBaets St., Winnipeg, MB, 204-254-2494

#### **2.2. MATERIALS**

- .1 Sheet Cladding: weathering steel, A606-4, sized appropriately to minimize waste cutoff based on shop drawings, minimum 22 ga. thickness (0.0299")
- .2 Perforated Metal Rainscreen: perforated weathering steel, A606-4, western rib profile, 30.5% open area (.127" round holes with 7/32" stagger), sized appropriately to minimize waste cutoff based on shop drawings, minimum 22 ga. thickness (0.0299")
- .3 Sheet Metal Rainscreen: weathering steel, A606-4, sized appropriately to minimize waste cutoff based on shop drawings, minimum 20 ga. thickness (0.0359")
- .4 Substructure: weathering steel A606-4 bent plate angle/girts/bent plates, sizes as indicated on drawings. Furring locations to align to fastening system and spacing as per drawings.
- .5 Adhesive: building adhesive to suit substrate conditions and recommended manufacturer's instructions and warranty. Sheet cladding adhered to XPS insulation.
- .6 Fasteners to be stainless steel, self-drilling, self-tapping as indicated.
- .7 Weathering steel flashings: weathering steel A606-4, minimum 22 ga. thickness (0.0299")

#### **2.3. PERFORMANCE REQUIREMENTS**

- .1 Air space at top and bottom of building, or each wall termination shall be 7/8" to facilitate airflow from behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top so there is air movement behind each panel. Air flow behind the panels is critical to the performance of the Rear Ventilated Rain Screen design.
- .2 Fasteners shall accommodate thermal expansion/contraction without excessive stress to the panel.
- .3 Design and install cladding system to allow for thermal movement of local climate with at least 60 degrees C ambient or panel temperature fluctuations, without causing undue stress on fasteners or panel or other detrimental effects.
- .4 Design to accommodate, by means of control joints, movement in wall system and between wall system and building structure, caused by structural movements, without

- permanent distortion, damage to in fills or racking of joints.
- .5 Design members and suspension system to withstand gravity load, live loads, including negative loads, as calculated in accordance with the building code.

### **3. EXECUTION**

#### **3.1. EXAMINATION**

- .1 Verification of Conditions:
  - .1 Examine substrates to receive work and surrounding adjacent surfaces for conditions affecting installation. Coordinate with related sections to ensure proper dimensions are maintained.
  - .2 Verify site dimensions by accurate field measurements so that work will be accurately designed, fabricated and fitted to the structure.
  - .3 All penetrations through the façade for the work of other trades shall be fitted with a watertight sleeve. Verify flashings are in place, sealed with waterproof membrane and covered with building membranes.
  - .4 Maintain sheathing membrane integrity.
- .2 Notify Contract Administrator in writing of any conditions that are not acceptable.
- .3 Proceed with installation after verification and correction of surface conditions acceptable to manufacturer.

#### **3.2. INSTALLATION**

- .1 Install sheet cladding adhered to XPS behind perforated metal rainscreen.
- .2 Install sill flashings, inside corner flashings, edgings and flashings over openings as required.
- .3 Erect siding system in accordance with drawings.
- .4 Erect siding system in straight lines, true, level and plumb. Maintain dimensions required by drawings for minimum distances from edge for holes and penetrations.
- .5 Installation to allow for thermal expansion of the panel.
- .6 Install panels with joints centered over framing. Install all fasteners straight to the panel and in a consistent manner.
- .7 Do not install using damaged, warped or misaligned material.
- .8 Where panels fit into accessories, allow room for expansion.
- .9 Finished installation shall be properly secured, free of rattles, distortions, waviness, and protrusions, damaged or chipped components.
- .10 Cut and flash wall penetrations with metal flashing.
- .11 Install breathable sheathing membrane in accordance to manufacturer's instructions. No penetrations are to be left in installed membrane.

#### **3.3. CLEANING**

- .1 Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.
- .2 Restore panels and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Contract Administrator, remove and replace damaged systems with new at no additional cost to the Owner.
- .3 Clean in accordance with Section 01 74 11 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## **1. GENERAL**

### **1.1. RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 21 29 – Sprayed Insulation
- .3 Section 07 26 00 – Vapour Retarders
- .4 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .5 Section 07 62 00 – Sheet Metal Flashings & Trim
- .6 Section 07 84 00 – Firestopping
- .7 Section 07 92 00 – Joint Sealants
- .8 Section 08 11 00 – Metal Doors & Frames
- .9 Section 08 44 23 – Structural Sealant Glazed Curtain Walls

### **1.2. REFERENCES**

- .1 Specification American Society for Testing and Materials (ASTM):
  - .1 ASTM B136 - Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
  - .2 ASTM B244 - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.
  - .3 ASTM C834 - Standard Specification for Latex Sealants.
  - .4 ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - .5 ASTM C1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.
  - .6 ASTM D1117 - Standard Guide for Evaluating Nonwoven Fabrics.
  - .7 ASTM D1730 - Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.
  - .8 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - .9 ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
  - .10 ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  - .11 ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
  - .12 ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 Underwriter Laboratories of Canada (ULC):
  - .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies
  - .2 CAN/ULC-S114-05, Standard Method of Test for Determination of Non-combustibility in Building Materials
  - .3 CAN/ULC-S134-92, Fire Test for Exterior Wall Assemblies
  - .4 CAN/ULC-S135-04, Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), Includes Amendment 1

### **1.3. ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination: Coordinate the Work of this Section with the installation of gypsum sheathing board and air barrier; Sequence work so that installation of fiber cement panels and support framing coincides with installation of substrate preparation without causing delay to the Work.

- .2 Pre-Construction Conference: Arrange a site meeting attended by the Contractor, the Subcontractor, the Contract Administrator, materials supplier(s), and other relevant personal before commencement of work for this Section; as indicated in Section 01 31 19 Project Meetings.
  - .1 Review methods and procedures related to installation, including manufacturer's written instructions;
  - .2 Examine substrate conditions for compliance with manufacturers installation requirements;
  - .3 Review temporary protection measures required during and after installation

#### **1.4. SUBMITTALS**

- .1 Provide requested information in accordance with Section 01 33 00 Submittals Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
  - .1 Shop Drawings: Submit shop drawings of panel systems, components, façade material, panel layout and accessories to the Contract Administrator for review.
  - .2 Samples:
    - .1 Submit full size samples of accessories as requested by Contract Administrator.
  - .3 Manufacturers Warranties: Submit copies of manufacturers warranties.
  - .4 Operation and Maintenance Data: Submit manufacturer's written instructions for cleaning solutions, materials and procedures, include name of original installer and contact information in accordance with Section 01 78 00 Closeout Submittals.
    - .1 Provide specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

#### **1.5. QUALITY ASSURANCE**

- .1 Qualifications: Provide proof of qualifications when requested by Contract Administrator:
  - .1 Manufacturer / Supplier: Obtain materials from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties.
  - .2 Installers: Execute Work of this Section using qualified personnel skilled in installation of work of this Section, having a minimum of five (5) years proven experience of installations similar in material, design, and extent to that indicated for this Project.

#### **1.6. MOCK-UPS**

- .1 Mock-ups: Construct mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution in accordance with Section 01 45 00 Quality Control for mock-ups and as follows:
  - .1 Build mock-up of typical wall section, incorporating the panel and finish, support framing and anchoring, breathable membrane, substrate materials, and adjacent materials including flashing, doors, windows and trim.
- .2 Notify Contract Administrator a minimum seven days prior to mock-up construction.
- .3 Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Contract Administrator specifically notes such deviations in writing.
- .4 Once reviewed by Contract Administrator, acceptable mock-up can form a permanent part of the Work, and will form the basis for acceptance for the remainder of the project.

- .5 Remove and replace materials found not acceptable at no cost to Owner or Contract Administrator.

**1.7. DELIVERY, STORAGE AND HANDLING**

- .1 Delivery: At the time of delivery, visually inspect all materials for damage. Note any damaged to materials on the receiving ticket and immediately report to the shipping company and the material manufacturer.
  - .1 Remove damaged materials from the site immediately.
- .2 Storage: Store materials in accordance with manufacturer's written instructions, raised off the ground and cover with a weather proof flame resistant sheeting or tarpaulin.
- .3 Handling: Material shall be handled in accordance with sound material handling practices and in accordance with manufacturer's written instructions.

**1.8. SITE CONDITIONS**

- .1 Site Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings where panels are indicated to fit walls and other construction.
- .2 Establish dimensions and proceed with fabricating panels where field measurements cannot be made without delaying the work; allow for site trimming and fitting.
- .3 Ambient Conditions: Install materials outlined in this Section after completion of work by other Sections is complete, and all penetrations are watertight; to provide adequate dry, clean, level, and plumb surfaces for installation and adhesion.

**1.9. WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

**1.10. WARRANTY**

- .1 Product Warranty: Limited, non-pro-rated product warranty.
  - .1 HardiPanel HZ5 vertical siding for 30 years.
- .2 Finish Warranty: Limited product warranty against manufacturing finish defects.
  - .1 When used for its intended purpose, properly installed and maintained according to James Hardie's published installation instructions, James Hardie's ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.
- .3 Workmanship Warranty: Application limited warranty for 2 years.

**1. PRODUCTS**

**1.1. MANUFACTURER**

- .1 Acceptable Manufacturer: James Hardie Building Products, Inc (or approved equal in accordance with B7) which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: request info (info@jameshardie.com); Web: [www.jameshardiecommercial.com](http://www.jameshardiecommercial.com)

**1.2. MATERIALS**

- .1 Cement Cladding Panels: HardiPanel HZ5 Vertical Siding as manufactured by James Hardie Building Products, Inc., smooth face, iron gray, 5/16 inches thick, 48 inches (1219 mm) wide by 96 inches (2438 mm) long.

- .2 Substructure: aluminum bent plate angle/girts/bent plates, sizes as indicated on drawings. Furring locations to align to fastening system and spacing as per drawings.
- .3 Adhesive: building adhesive to suit substrate conditions and recommended manufacturer's instructions and warranty. Sheet cladding adhered to XPS insulation.
- .4 Fasteners to be TW-S 300 stainless steel, head colour-matched, self-drilling, self-tapping as indicated.
- .5 Trims to be EasyTrim reveals as recommended by James Hardie for closed system to maintain warranty. Colour matched to panel.
  - .1 EasyTrim EZ.4 horizontal joints
  - .2 EasyTrim EZ.9 terminate top and sides of extent of panel finish
  - .3 EasyTrim EZ.7 2-piece vertical joint
- .6 Flashings: pre-finished aluminum as indicated on drawings.

## **2. EXECUTION**

### **2.1. EXAMINATION**

- .1 Verification of Conditions:
  - .1 Examine substrates to receive work and surrounding adjacent surfaces for conditions affecting installation. Coordinate with related sections to ensure proper dimensions are maintained.
  - .2 Verify site dimensions by accurate field measurements so that work will be accurately designed, fabricated and fitted to the structure.
  - .3 All penetrations through the façade for the work of other trades shall be fitted with a watertight sleeve. Verify flashings are in place, sealed with waterproof membrane and covered with building membranes.
  - .4 Maintain sheathing membrane integrity.
- .2 Notify Contract Administrator in writing of any conditions that are not acceptable.
- .3 Proceed with installation after verification and correction of surface conditions acceptable to manufacturer.

### **2.2. INSTALLATION**

- .1 Install materials in strict accordance with manufacturer's installation instructions.
- .2 Place fasteners no closer than 2 inch (51 mm) from panel edges and panel corners and spaced as per manufacturer's instructions.
- .3 Install EasyTrims as per manufacturer's instructions to maintain warranty.
- .4 Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- .5 Maintain clearance between siding and adjacent finished grade.
- .6 Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
  - .1 Touch-up nicks, scrapes, and screw heads in pre-finished siding using the manufacturer's touch-up kit pen.
  - .2 Touch-up of screws shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
  - .3 Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

### **2.3. CLEANING**

- .1 Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.
- .2 Restore panels and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as

determined by the Contract Administrator, remove and replace damaged systems with new at no additional cost to the Owner.

- .3 Clean in accordance with Section 01 74 11 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**2.4. PROTECTION**

- .1 Protect installed products until completion of project.
- .2 Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION.**

## 1. GENERAL

### 1.1. RELATED REQUIREMENTS

- .1 Section 07 26 00 – Vapour Retarders
- .2 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .3 Section 07 62 00 – Sheet Metal Flashings & Trim
- .4 Section 07 71 00 – Roof Specialties
- .5 Section 07 92 00 – Joint Sealants

### 1.2. REFERENCES

- .1 ASTM International Inc.
  - .1 ASTM C 726-[05], Standard Specification for Mineral Fiber Roof Insulation Board.
  - .2 ASTM C 728-[05], Standard Specification for Perlite Thermal Insulation Board.
  - .3 ASTM C 1177/C 1177M-[06], Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .4 ASTM C 1396/C 1396M-[06a], Standard Specification for Gypsum Board.
  - .5 ASTM D 41-[05], Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  - .6 ASTM D 312-[00(2006)], Standard Specification for Asphalt Used in Roofing.
  - .7 ASTM D 448-[03a], Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
  - .8 ASTM D 2178-[04], Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  - .9 ASTM D 6162-[00a], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  - .10 ASTM D 6163-[00e1], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .11 ASTM D 6164-[05], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
  - .12 ASTM D 6222-[02e1], Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
  - .13 ASTM D 6223-[02e1], Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
  - .14 ASTM D 6509-[00], Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-9Ma-[83], Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  - .2 CGSB 37-GP-56M-[80b(A1985)], Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
  - .3 CAN/CGSB-51.33-[M89], Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .4 Canadian Roofing Contractors Association (CRCA)
  - .1 CRCA Roofing Specifications Manual-[1997] .
- .5 Underwriters Laboratories' of Canada (ULC)
  - .1 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

- .2 CAN/ULC-S702.2-[03], Standard for Mineral Fibre Thermal Insulation for Buildings.
- .3 CAN/ULC-S704-[03], Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN/ULC-S706-[02], Standard for Wood Fibre Thermal Insulation for Buildings.

**1.3. PERFORMANCE REQUIREMENTS**

- .1 All waterproofing materials will be provided by the same manufacturer. Compatibility between components of roofing system is essential.

**1.4. SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.
- .3 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Indicate flashing, control joints.
- .5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .6 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .7 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

**1.5. QUALITY ASSURANCE**

- .1 Roofing Contractors and Subcontractors must, when bidding or performing Work, possess a roofing Contractor operating license.
- .2 Roofing Contractors and Subcontractors must also be registered with SOPREMA's PAQ + S and provide the Contract Administrator with a SOPREMA certificate to this effect before beginning any roofing Work.
- .3 Only qualified, certified installers employed by a company with the appropriate equipment may execute the roofing Work.
- .4 Roofing Contractors and Subcontractors must also be members of Local Chapter of Canadian Roofing Association and provide the Contract Administrator with a certificate to this effect before beginning any roofing Work.
- .5 The roofing product manufacturer can delegate a representative to visit the Work Site at the start of roofing installation.
- .6 The Contractor must at all times enable and facilitate access to the Work Site by said representative.
- .7 Convene pre-installation meeting one week prior to beginning waterproofing Work, with Contract Administrator to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

**1.6. STORAGE AND HANDLING**

- .1 All materials will be delivered and stored in conformance with the requirements described in the Manufacture's Manual; they must remain in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.
- .2 At all times, materials will be adequately protected and stored in a dry and properly ventilated area, away from any welding flame or spark and sheltered from the elements or any harmful substance.
- .3 Only materials destined for same-day use can be removed from this storage area. In cold weather, these materials should be stored in a heated area at a minimum temperature of

- .4 +100C and removed prior to application.
- .4 If rolls cannot be stored in a heated environment, they may be pre-conditioned before installation. For precise description, consult Manufacturer's "Roofers' Guide" on membrane application procedures.
- .5 Store adhesives and emulsion-based waterproofing mastics at a minimum +50C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.
- .6 Store rolls upright; flashing to be stored to avoid creasing, buckling, scratches or any other possible damage.
- .7 Avoid material overloads which may affect the structural integrity of specific roof areas.
- .8 Place plywood runways over completed Work to enable movement of material and other traffic.

### **1.7. PROTECTION**

- .1 Prior to the start of Work, conduct a Site inspection to establish safe Working practices and make sure that all procedures and proposed changes are approved to minimize the risk of fires.
- .2 Conform to Health and Safety Plan, Manufacturer's Specifications Manual and local CRA association recommendations.
- .3 At the end of each Workday, use a heat detector gun to spot any smouldering or concealed fire.
- .4 Maintain fire watch for 1 hour after each day's roofing operations cease.
- .5 Throughout roofing installation, maintain a clean Site and have one approved ABC fire extinguisher within 6 meters of each roofing torch.

### **1.8. ENVIRONMENTAL REQUIREMENTS**

- .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C for peel and stick to manufacturers' recommendations.
- .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

### **1.9. WARRANTY**

- .1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 60 months.

## **2. PRODUCTS**

### **2.1. DECK COVERING**

- .1 Fiberglass mat faced gypsum roof board:
  - .1 Thickness: 5/8"
  - .2 Size: 48" x 96"
  - .3 Weight: 2.5 lb/sq. ft.
  - .4 Surfacing: Fiberglass mat.
  - .5 Flexural Strength, Parallel (ASTM C473): 100 lbf, minimum.
  - .6 Flute Span (ASTM E661): 8 inches.
  - .7 Permeance (ASTM E96): greater than 32 perms.
  - .8 R-Value (ASTM C518): 0.67.
  - .9 Water Absorption (ASTM C1177): Less than 10 percent of weight.
  - .10 Compressive Strength (Applicable Sections of ASTM C472): 900 psi
  - .11 Surface Water Absorption (ASTM C473): Not more than 2.5 grams.
  - .12 Acceptable Products:
    - .1 DensDeck, Georgia-Pacific Gypsum.

## 2.2. VAPOUR RETARDER

- .1 Self-adhesive Air/Vapour Barrier: membranes composed of bitumen modified with thermoplastic polymers and high-density polyethylene film. The width of the membrane to be 1.14 meters (45 inches). The self-adhesive under face is covered with a silicone release sheet. Water vapour permeability: 0.06 ng/Pa·s·m<sup>2</sup> (0.0011 Perm).]
- .2 Acceptable material: SOPRAVAP'R by SOPREMA (or approved equal in accordance with B7).
- .3 Vapour retarder continuity strip: waterproofing membrane with non-woven polyester reinforcement, fiberglass and elastomeric bitumen. The upper surface is sanded and the under face is self-adhesive.

## 2.3. INSULATION

- .1 Insulation: As specified in Section 07 21 13 – Board Insulation

## 2.4. MEMBRANE SYSTEM

- .1 Acceptable system: COLVENT system (semi-independent self-adhesive base sheet) by SOPREMA (or approved equal in accordance with B7).
- .2 Reinforced elastomeric bitumen waterproofing system with a semi-independent, self-adhesive base sheet and a heat-welded cap sheet. The top surface of the base sheet is covered with a thermo-fusible plastic film and must have three distinctive blue lines to facilitate roll alignment. The bottom surface of the cap sheet is covered with a thermofusible plastic film and the top surface protected by coloured granules.
- .3 Components
  - .1 Reinforcement: combination of glass and polyester
  - .2 Elastomeric bitumen: blend of selected bitumen and SBS polymer
  - .3 System properties: Traffic only            MD      XD
    - .1 Strain energy (kN/m)            9.4      9.2
    - .2 Breaking strength (N/5 cm)    19.2     16.3
    - .3 Ultimate elongation (%)        54       62
    - .4 Cold bending at -30°C        No cracking
    - .5 Softening point                ≥ 110°C
    - .6 Static puncture (N)            380
- .4 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft).
- .5 Acceptable materials:
  - .1 Base sheet membrane: COLVENT BASE 810 by SOPREMA
  - .2 Cap sheet: COLVENT TRAFFIC CAP-860 by SOPREMA (grey colour)

## 2.5. UPSTAND SYSTEM (SELF ADHESIVE SHEET)

- .1 Membrane flashing to be two plies of reinforced modified bitumen membrane and the base sheet to be self-adhesive. The top surface of the base sheet is covered with a thermofusible plastic film and the bottom surface is protected by silicone release paper. Cap sheet top surface is protected with coloured granules and the bottom surface is covered with a thermofusible plastic film. Cap sheet membrane is applied by heatwelding.
- .2 Components
  - .1 Reinforcement: combination of glass and polyester
  - .2 Elastomeric bitumen: blend of selected bitumen and SBS polymer
  - .3 System properties:                            MD      XD
    - .1 Strain energy (kN/m)            8.4      8.3
    - .2 Breaking strength (N/5 cm)    18       16
    - .3 Ultimate elongation (%)        55       56
    - .4 Tear resistance (N)            120

- .5 Static puncture (N) 380
- .6 Dimensional stability (%) 0.1 0.4
- .7 Plastic flow (°C) 105
- .8 Cold bending (at -30°C) Initial No cracking -90 days at 70°C No cracking
- .4 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft).
- .5 Acceptable materials:
  - .1 Base sheet flashing membrane: SOPRAFLASH FLAM STICK by SOPREMA
  - .2 Cap sheet flashing membrane: SOPRALENE FLAM 180 GR by SOPREMA

## **2.6. ACCESSORIES MEMBRANES**

- .1 Roofing membrane reinforcement: with composite heavy duty, non-woven polyester, and glass mat, reinforcement and SBS modified bitumen. Both sides are, or the top face is covered with a thermofusible plastic film, sanded the underside is self-adhesive; as applicable for application. The top face must be marked with three (3) distinctive blue chalk lines to ensure proper roll alignment.
- .2 Components:
  - .1 Reinforcement: composite heavy duty, non-woven polyester, and glass mat.
  - .2 Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
- .3 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft).
- .4 Acceptable materials: SOPRAFLASH FLAM STICK, SOPRAFLASH STICK by SOPREMA.

## **2.7. PRIMER**

- .1 Primer for self-adhesive membranes: A blend of elastomeric bitumen, volatile solvents, adhesive enhancing resins used to prime porous substrates and non-porous substrates such as wood, concrete or metal to enhance the adhesion of self-adhesive membranes at temperatures above - 10°C.
- .2 Acceptable materials: ELASTOCOL STICK by SOPREMA.

## **2.8. COMPLEMENTRY WATERPROOFING PRODUCTS**

- .1 Waterproofing mastic: Mastic made of synthetic rubbers, plasticized with bitumen and solvents with aluminium pigments added for greater resistance to U.-V.
- .2 Acceptable material: SOPRAMASTIC ALU by SOPREMA

## **2.9. PREFABRICATED FLASHINGS**

- .1 Refer to Section 07 71 00 - Roof Specialties

## **2.10. SEALERS**

- .1 Sealants: Caulking - see Section 07 92 00 - Joint Sealants.

## **2.11. CARPENTRY**

- .1 Refer to Section 06 10 00 - Rough Carpentry.

## **2.12. SUBSTITUTIONS**

- .1 Refer to Section 01 25 00 Substitution Procedures

## **3. EXECUTION**

### **3.1. WORKMANSHIP**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual, Provincial Roofing Association Manual, particularly for fire safety precautions, and to FM.
- .2 The interface of the walls and roof assemblies will be fitted with durable rigid material

providing connection point for continuity of air barrier.

- .3 Assembly, component and material connections will be made in consideration of appropriate design loads.

### **3.2. EXAMINATION OF ROOF DECKS**

- .1 Inspect with Contract Administrator deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Prior to beginning of Work ensure:
  - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
  - .2 Curbs have been built.
  - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
  - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.

### **3.3. PROTECTION**

- .1 Cover walls, walks, sloped roofs and adjacent Work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Contract Administrator.
- .6 At end of each day's Work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

### **3.4. APPLICATION PRIMER**

- .1 Apply one coat primer to Manufacturer's installation manual.

### **3.5. INSTALLATION OF DECK COVERING**

- .1 Adhered or Mechanically Attached: As recommended by roof system and/or adhesive manufacturer or as required by FM or UL guidelines for wind uplift resistance.

### **3.6. INSTALLATION OF VAPOUR RETARDER**

- .1 Beginning at the bottom of the slope, without adhering the membrane, unroll onto the substrate for alignment. Do not immediately remove the silicone release sheet.
- .2 Align the roll parallel to the corrugations of the steel deck. Make sure the membrane overlaps are supported along their entire length.
- .3 Peel back one end of the silicone release sheet and adhere this part of the membrane to the substrate. Peel back the remaining release sheet at a 45° angle to avoid wrinkles in the membrane.
- .4 Overlap adjacent membranes by 75 mm. Overlap end laps by 150 mm. Stagger end laps by at least 300 mm.
- .5 The primer must be dry when the vapour retarder is installed
- .6 The roof vapour retarder must meet and overlap the air/vapour barrier on adjoining walls to ensure total continuity.
- .7 Install vapour retarder membrane at insulation perimeters and around each element piercing the insulation to ensure sealed connections with base sheet at upstands.
- .8 Roof vapour retarder must meet and overlap the air/vapour barrier on adjoining walls to ensure total continuity.
- .9 Install vapour retarder membrane at insulation perimeters and around each element

piercing the insulation to ensure sealed connections with base sheet at upstands.

**3.7. INSULATION INSTALLATION**

- .1 Attach insulation with manufacturers recommended adhesive.
- .2 Stagger all vertical joints between two rows of insulation board.

**3.8. INSTALLATION OF SELF-ADHESIVE SEMI-ADHERED BASE SHEET (COLVENT) SYSTEM**

- .1 Beginning at the low points, drains and perpendicular to the slope, install the base sheet membrane without adhering in parallel strips.
- .2 Each strip should overlap the preceding strip by 75 mm along the side joint (use the blue line to facilitate alignment) and by 25 mm at the ends. Because of the nature of this system, base sheet membrane joints can be aligned (no staggering) to facilitate the installation of the reinforcing band.
- .3 Let the membrane relax at least 15 minutes before installing it, or burn the plastic film in a zigzag fashion using a propane torch to relax it. In cold weather, use the second method.
- .4 Peel back the silicone release paper to adhere the membrane to the substrate. Use a broom or brush to apply even pressure and ensure good adherence.
- .5 Remove the paper protecting the selvedge then heat the side joints. Seal the joints using a trowel. A bead of molten bitumen should appear along the joint to ensure a perfect seal.
- .6 Seal the end joints by welding a 300-mm-wide cover strips centred on the joint.
- .7 The base sheet membrane should end over the cant strip or at the edge of the substrate.

**3.9. INSTALLATION OF REINFORCEMENT GUSSETS**

- .1 Install gussets at every angle, on inside and outside corners.

**3.10. BASE SHEET FLASHING INSTALLATION (SELF ADHERED)**

- .1 Apply base sheet flashing only once primer coat is dry.
- .2 Before applying membranes, always remove the plastic film on the section to be covered if there is an overlap (inside and outside corners and field surface). For sanded base sheet membranes, apply ELASTOCOL STICK to the area to be covered at the foot of the parapets.
- .3 Position the pre-cut membrane piece. Peel back 4 to 6 inches (100 to 150 mm) of the silicone release paper to hold the membrane in place at the top of the parapet.
- .4 Then, gradually peel back the remaining silicone release paper, pressing down on the membrane with an aluminium applicator to ensure good adhesion. Use the aluminium applicator to ensure a perfect transition between the upstand and the field surface. Smooth the entire membrane surface with a roller for full adhesion.
- .5 Cut off corners at end laps to be covered by the next roll.
- .6 Install a reinforcing gusset in all inside and outside corners.
- .7 Always seal overlaps at the end of the Workday.

**3.11. ROOF CAP SHEET INSTALLATION (TORCH APPLIED MEMBRANE)**

- .1 Once base sheet is applied and no defects are apparent, proceed with cap sheet installation.
- .2 Begin with double-selvage starter roll. If starter roll is not used, side laps covered in granules must be degranulated by embedding side laps in torch-heated bitumen over a 75 mm width.
- .3 Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge).
- .4 Weld cap sheet onto base sheet with torch recommended by membrane manufacturer. During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.
- .5 Avoid overheating.

- .6 Make sure joints between the two layers are staggered by at least 300 mm.
- .7 Overlap cap sheet side laps by 75 mm and end laps by 150 mm. Cut off corners at end laps to be covered by next roll. All overlap surfaces must be degranulated.
- .8 Complete perfect welds between two membranes. Leave no zone unwelded. In cold weather, adjust welding time to obtain homogenous seam (it may be necessary to slow down in certain cases.)
- .9 Once cap sheet is installed, carefully check all overlapped joints.
- .10 During installation, take care to avoid excessive bitumen bleed-out at joints.

**3.12. INSTALLATION OF CAP SHEETS ON UPSTANDS AND PARAPETS (HEAT WELDED)**

- .1 Cap sheet must be installed in one-metre-wide strips. The side joints must overlap by 75 mm and must be staggered by at least 100 mm with respect to the joints of the cap sheet on the field surface to avoid areas of excessive membrane thickness. The overlaps on the field surface must be 50 mm wider than those of the base sheet membrane on the upstands and parapets. At end laps, angle-cut the corners that will be covered by the following roll.
- .2 Use a chalk line to draw a straight line on the field surface 150 mm from the upstands and parapets.
- .3 Use a propane torch and round-nose trowel to embed the surface granules in the layer of hot bitumen [starting from the chalk line on the field surface to the bottom edge of the upstand or parapet as well as] on the granulated vertical surfaces that are to be overlapped.
- .4 This cap sheet will be heat-welded directly to the base sheet membrane, proceeding from bottom to top. This technique softens both membranes in order to obtain even, continuous weld.

**3.13. WATERPROOFING FOR DRAINS, VARIOUS DETAILS**

- .1 Install waterproofing membranes in conformance with various roofing details illustrated in the SOPREMA Manual.

**3.14. FIELD QUALITY CONTROL**

- .1 Comply with the requirements of Section (01 45 00 – Quality Control)
- .2 All work to be inspected by a qualified testing agency upon completion of work.

**3.15. CLEANING**

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by Work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by Work of this section.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## 1. GENERAL

### 1.1. RELATED REQUIREMENTS

- .1 Section 07 26 00 – Vapour Retarders
- .2 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .3 Section 07 92 00 – Joint Sealants
- .4 Section 08 11 00 – Metal Doors & Frames
- .5 Section 08 44 23 – Structural Sealant Glazed Curtain Walls

### 1.2. REFERENCES

- .1 AAI-Aluminum Sheet Metal Work in Building Construction-[2002].
- .2 AAI DAF45-[03], Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 167-[99(2004)], Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2 ASTM A 653/A 653M-[07], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual [1997].
- .4 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .5 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.
  - .2 CAN/CGSB-93.1-[M85], Sheet Aluminum Alloy, Prefinished, Residential.
- .6 Canadian Standards Association (CSA International)
  - .1 CSA A123.3-[05], Asphalt Saturated Organic Roofing Felt.
  - .2 AAMA/WDMA/CSA 101/I.S.2/A440-[2008], Standard/Specification for Windows, Doors, and Unit Skylights.
  - .3 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.
- .7 Green Seal Environmental Standards
  - .1 Standard GS-03-[93], Anti-Corrosive Paints.
  - .2 Standard GS-11-[97], Architectural Paints.
  - .3 Standard GS-36-[00], Commercial Adhesives.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .9 SMACNA – Architectural Sheet Metal Manual.

### 1.3. 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 for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit duplicate 4" x 4" samples of each type of sheet metal material, finishes and colours.
- .4 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

### 1.4. QUALIFICATIONS

- .1 Fabricator and Installer: Company specializing in sheet metal flashing work with minimum 3 years documented experience.

**1.5. DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- .3 Prevent contact with materials which may cause discolouration or staining.

**1.6. COORDINATION**

- .1 Coordinate work with related sections and adjacent work.

**2. PRODUCTS**

**2.1. SHEET METAL MATERIALS**

- .1 Aluminum Sheet: Coil Coated: AAMA 611, AA-M12C22A41, Class I, ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
- .2 Surface: Smooth, flat.
- .3 Exposed Coil-Coated Finishes:
  - .1 Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both colour coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- .4 Concealed Finish: Pretreat with manufacturer's standard white or light-coloured acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry thickness of 0.5 mil
- .5 Colour Coat:
  - .1 Parapet cap flashings: dark bronze anodized
  - .2 Base flashings: dark bronze anodized and weathering steel where indicated on drawings.

**2.2. ACCESSORIES**

- .1 Fasteners: 300 series stainless steel
- .2 Underlayment: ASTM D226, No.15 asphalt saturated roofing felt.
- .3 Primer: Zinc chromate type.
- .4 Protective Backing Paint: Bituminous.
- .5 Sealant: Polyurethane type, specified in Section 07 92 00 Joint Sealants.
- .6 Plastic Cement: ASTM D4586, Type I.
- .7 Reglets: Recessed type, aluminum

**2.3. FABRICATION**

- .1 Fabricate metal flashings and other sheet metal work as indicated.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces to maximum lengths.
- .4 Hem exposed edges on underside ½".
  - .1 Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Fabricate corners

- .1 Of one piece with minimum 18" long legs, seal with sealant.
- .2 Southeast and southwest corner polished mirror alum. to be underlapped and sealed with pre-finished black alum. w/caulking as shown on drawings.
- .7 Fabricate vertical faces with bottom drip edge outward ¼".
- .8 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

#### **2.4. BASE FLASHING**

- .1 Aluminum Sheet dark bronze anodized where indicated, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 18 Ga. or thicker.
- .2 Weathering Steel A606-4 where indicated, 22 Ga. or thicker.
- .3 Provide necessary fastenings.
- .4 Fabricate in min. 96" long and max. 120" long sections, 2" lap joint between sections.
- .5 Refer to drawings for detail of joint lines and type of flashing.

#### **2.5. ROOF-EDGE FLASHING**

- .1 Aluminum Sheet: dark bronze anodized, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 22 Ga. or thicker.
- .2 Provide necessary fastenings.
- .3 Fabricate in min. 96" long and max. 120" long sections, 2" lap joint between sections.
- .4 Refer to drawings for detail of joint lines.

#### **2.6. SCUPPERS**

- .1 Aluminum Sheet: dark bronze anodized, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 22 Ga. or thicker.
- .2 Fabricate with one piece deck flange, min 150mm. Contour scuppers to cant strips.
- .3 Provide necessary fastenings.

### **3. EXECUTION**

#### **3.1. EXAMINATION**

- .1 Examine surfaces to receive flashings. Notify the Contract Administrator of surfaces which are considered unacceptable to receive the Work of this Section.
- .2 The commencement of flashing Work will imply unconditional acceptance of the surfaces and substrates to which the flashing is to be fastened.
- .3 Verify that the following are located and installed as detailed on drawings:
  - .1 Plywood and lumber nailer plates to walls and parapets.
  - .2 Control joints.

#### **3.2. INSTALLATION**

- .1 Install sheet metal work as detailed.
- .2 Install flashings not later than 7 days after installation of the membrane on any particular section of the roof.
- .3 Use concealed fastenings except where approved before installation.
- .4 Provide underlay under sheet metal.
  - .1 Secure in place and lap joints 100 mm.
- .5 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
- .6 Lock end joints and caulk with sealant.
- .7 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .8 Insert metal flashing under cap flashing to form weather tight junction.
- .9 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .10 Caulk flashing at cap flashing with sealant.

- .11 Install pans, where shown around items projecting through roof membrane.
- .12 Provide 16 Ga. flashing at all areas where glazing terminates at grade beam.

**3.3. SCUPPERS**

- .1 Install scuppers as indicated.
  - .1 Overflow roof scuppers. Height to be 6" above internal roof drain elevations.

**3.4. 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 Leave work areas clean, free from grease, finger marks and stains.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## **1. GENERAL**

### **1.1. RELATED REQUIREMENTS**

- .1 Section 07 26 00 – Vapour Retarders
- .2 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .3 Section 07 62 00 – Sheet Metal Flashings& Trim
- .4 Section 07 92 00 – Joint Sealants

### **1.2. REFERENCES**

- .1 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .2 Canadian Standards Association
  - .1 CSA B272-93 – Prefabricated Self-Sealing Roof Vent Flashings
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual [1997].
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.
  - .2 CAN/CGSB-93.1-[M85], Sheet Aluminum Alloy, Prefinished, Residential.
- .5 SMACNA – Architectural Sheet Metal Manual.

### **1.3. 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 for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

### **1.4. QUALIFICATIONS**

- .1 Fabricator and Installer: Company specializing in design and fabrication of roofing specialties with minimum 5 years documented experience.

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- .3 Prevent contact with materials which may cause discolouration or staining.

### **1.6. COORDINATION**

- .1 Coordinate work with related sections and adjacent work.

### **1.7. WARRANTY**

- .1 Warrant products installed under this section of Work to be free of leaks, condensation and defects in materials and/or manufacture for a period of 20 years when installed in accordance with the manufacturer's written instructions.

## **2. PRODUCTS**

### **2.1. ACCEPTABLE MANUFACTURER**

- .1 Provide products as manufactured by Thaler Metal Industries, 1-800-387-7217

Mississauga, Ontario, Canada (or approved equal in accordance with 01 62 00 Substitutions).

- .1 20 year warranty against leaks, condensation and defects in materials and/or manufacture, as applicable
- .2 Structural rating for up to 12,000 lbf (53.28kN) strength for anchors equipped with forged round eye
- .3 Structural integrity backed by \$7,000,000.00 liability insurance
- .4 Compliance with CSA B272-93 (Prefabricated Self-Sealing Roof Vent Flashings)
- .5 Air barrier design using EPDM seals only;
- .6 Maintenance free design;
- .7 Materials and sizes options, and thickness;
- .8 Injection molded urethane insulation to CGSB-51-GP 46MP and ASTM C1029-90, as applicable;
- .9 Air barrier flashing design using EPDM seals only complying with CSA B272-93 flashing standard
- .10 Maintenance free design
- .11 Treated deck flange, as applicable;
- .12 Written installation instructions.

## **2.2. MANUFACTURED UNITS**

- .1 Removable Cap STACK JACK Flashing (Insulated)
  - .1 Vent stack flashing:
    - .1 Thaler SJ-27-A, 18" (457 mm) high Removable Cap STACK JACK Flashing (Insulated);
    - .2 .064" (1.6 mm) mill finish 1100-OT alloy aluminum
    - .3 Diameter sizes to suit, see Mechanical. Confirm with Contract Administrator prior to ordering.
    - .4 To CSA B272-93
    - .5 With removable cap, pre-molded urethane insulation liner, and EPDM Base Seal;
    - .6 Bituminous painted deck flange
    - .7 SS Vandal proof cap.

## **3. EXECUTION**

### **3.1. EXAMINATION**

- .1 Report to the Contract Administrator in writing, defects of Work prepared by other trades and other unsatisfactory Site conditions.
- .2 Verify site dimensions.

### **3.2. INSTALLATION**

- .1 Flashing
  - .1 Install flashings in accordance with manufacturer's printed instructions.
  - .2 Torch membrane until bitumen is fluid and set flange into fluid. Flash in flange with two overlapping layers of ModBit and seal with asphalt sealer. Do not overheat (melt) EPDM Base Seal.

### **3.3. FIELD QUALITY CONTROL**

- .1 Comply with the requirements of Section (01 45 00 – Quality Control)
- .2 All work to be inspected by a qualified testing agency upon completion of work.

**3.4. ADJUSTING**

- .1 Verify that all manufactured units have been installed in accordance with specifications and details, and will function as intended. Adjust any items where necessary to ensure proper operation.

**3.5. CLEANING**

- .1 Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaners or techniques which could impair performance of the roofing system.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**

## **1. GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 03 41 13 – Precast Concrete Hollow Core Planks
- .3 Section 04 22 00 – Concrete Unit Masonry
- .4 Section 09 21 16 – Gypsum Board Assemblies
- .5 Section 13 32 13 – Metal Space Frames

### **1.2. REFERENCES**

- .1 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-S115-[1995], Fire Tests of Fire stop Systems.

### **1.3. 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.

### **1.4. SYSTEM DESCRIPTION**

- .1 Firestopping Materials: ULC to achieve a fire rating as noted in Drawings.

### **1.5. REGULATORY REQUIREMENTS**

- .1 Conform to Manitoba Building Code for fire resistance ratings and surface burning characteristics.
- .2 Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

### **1.6. ENVIRONMENTAL REQUIREMENTS**

- .1 Do not apply materials when temperature of substrate material and ambient air is below 15 degrees C.
- .2 Maintain this minimum temperature before, during and for curing for 3 days after installation of materials.
- .3 Provide ventilation in areas to receive solvent cured materials.

**1.7. 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 location proposed material, reinforcement, anchorage, fastenings and methods of installation.
  - .2 Construction details should accurately reflect actual job conditions.
- .4 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

**1.8. QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company specializing in fire stopping installations with 5 years documented experience approved by manufacturer.

**2. PRODUCTS**

**2.1. MATERIALS**

- .1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions confirming to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.
- .2 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.
  - .2 Firestop system rating: as indicated on drawings.
- .3 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .4 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe. No silicone based firestop are allowed to be applied on plastic pipes.
- .9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .11 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.
- .12 Sealants for vertical joints: non-sagging.

### **3. EXECUTION**

#### **3.1. MANUFACTURER'S INSTRUCTIONS**

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

#### **3.2. PREPARATION**

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
  - .1 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.

#### **3.3. INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturers 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.

#### **3.4. SEQUENCES OF OPERATION**

- .1 Proceed with installation only when submittals have been reviewed by Contract Administrator.
- .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.

#### **3.5. 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.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

#### **3.6. SCHEDULE**

- .1 Fire stop and smoke seal at:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Top of fire-resistance rated masonry and gypsum board partitions.
  - .3 Intersection of fire-resistance rated masonry and gypsum board partitions.

- .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .6 Openings and sleeves installed for future use through fire separations.
- .7 Around mechanical and electrical assemblies penetrating fire separations.
- .8 Rigid ducts: 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

### 1.1. RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete
- .2 Section 03 41 13 – Precast Concrete Hollow Core Planks
- .3 Section 04 22 00 – Concrete Unit Masonry
- .4 Section 07 26 00 – Vapour Retarders
- .5 Section 07 46 13 – Thermofused Membrane Air/Vapour Barrier
- .6 Section 07 62 00 – Sheet Metal Flashings and Trim
- .7 Section 07 84 00 – Firestopping
- .8 Section 08 11 00 – Metal Doors & Frames
- .9 Section 08 44 23 – Structural Sealant Glazed Curtain Walls
- .10 Section 09 21 16 – Gypsum Board Assemblies

### 1.2. REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM C 919-[02], Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canada Green Building Council (CaGBC)
  - .1 LEED Canada NC 2009, LEED: Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum).
- .3 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-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .5 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.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .7 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

### 1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00 Submittal Procedures – Shop Drawings, Product Data, and Samples, with the VOC levels highlighted.
- .3 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.
- .4 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Submit duplicate samples of each type of material and colour.
- .6 Cured samples of exposed sealants for each color where required to match adjacent material.
- .7 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Instructions to include installation instructions for each product used.
- .8 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 – LEED Sustainable Requirements.

#### **1.4. SITE CONDITIONS**

- .1 Environmental Limitations:
  - .1 Do not proceed with installation of joint sealants under following conditions:
    - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
    - .2 When joint substrates are wet.
- .2 Joint-Width Conditions:
  - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

#### **1.5. 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 Labour Canada.
- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 Adhesives and sealants must conform to State of California's South Coast Air Quality Management District (SCAQMD) Rule #1168, June 2006 with VOC contents as stipulated and meet the requirements of Section 01 35 20 – LEED Sustainable Requirements.

#### **1.6. QUALITY CONTROL**

- .1 Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- .2 Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- .3 Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:
  - .1 Locate test joints where indicated or, if not indicated, as directed by

Contract Administrator.

- .2 Conduct field tests for each application indicated below:
  - .1 Each type of elastomeric sealant and joint substrate indicated.
  - .2 Each type of non-elastomeric sealant and joint substrate indicated.

### 1.7. **MOCKUPS**

- .1 Mock-ups: Construct mock-ups of all exposed sealants to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution in accordance with Section 01 45 00 Quality Control for mock-ups and as follows:
  - .1 Provide mock-up of typical joints at all typical substrate conditions.
  - .2 Notify Contract Administrator a minimum seven days prior to mock-ups construction.
  - .3 Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Contract Administrator specifically notes such deviations in writing.
  - .4 Once reviewed by Contract Administrator, acceptable mock-up can form a permanent part of the Work, and will form the basis for acceptance for the remainder of the project.
  - .5 Remove and replace materials found not acceptable at no cost to Owner or Contract Administrator.

## 2. **PRODUCTS**

### 2.1. **SEALANT MATERIALS**

- .1 Do not use caulking that emits strong odors, contains toxic chemicals, or is not certified as mould resistant in air handling units.
- .2 Sealants and Caulking compounds must:
  - .1 Meet or exceed all applicable governmental and industrial safety and performance standards
  - .2 Be manufactured and transported in such a manner that all steps for the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, laws and regulations including for facilities located in Canada, the Fisheries Act and the Canadian Environmental Protection Act (CEPA).
- .3 Sealants and caulking compounds must not be formulated or manufactured with: aromatic solvents, fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium or their compounds, except barium sulphate.
- .4 Sealant and caulking compounds must not contain a total of volatile organic compound (VOC's) in excess of 5% by weight as calculated from records of the amounts of constituents used to make the product.
- .5 Where sealants are qualified with primers use only those primers.
- .6 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants.

### 2.2. **SEALANT MATERIAL DESIGNATIONS**

- .1 Acrylic Sealant: CGSB 19-GP-5M, single component, solvent curing, non-staining, non-bleeding, non-sagging, capable of continuous water immersion, colour to match adjacent materials.
- .2 Butyl Sealant: CGSB 19-GP-4M, single component, solvent release, non-skinning, non-sagging, butyl-polyisobutylene compound, colour to match adjacent materials.

- .3 Acoustical Sealant: CGSB 19-GP-21M, single component, non-skinning, high solids content, synthetic rubber, non-corrosive to metals or concrete, non-sagging.
- .4 Polyurethane Sealant: CGSB 19-GP-13M, single component, chemical curing, non-staining, non-bleeding, non-sagging, capable of continuous water immersion.
- .5 Silicone Sealant: CGSB 19-GP-18M, single component, solvent curing non-sagging, non-staining, fungus resistant non-bleeding, colour to match adjacent materials.

### **2.3. SEALANT SELECTION**

- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): Sealant type: Polyurethane.
- .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Sealant type: Butyl.
- .3 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: Butyl.
- .4 Exposed joints between hollowcore slabs to ¼" maximum width: Acrylic.
- .5 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: Silicone.
- .6 Control and expansion joints on the interior of exterior poured-in place concrete walls: Sealant type: Butyl.
- .7 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: Butyl.
- .8 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type: Silicone.
- .9 All vapour retarder seams between sheets and seals to framing: Acoustical.

### **2.4. JOINT CLEANER**

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
- .2 Primer: as recommended by manufacturer.

## **3. EXECUTION**

### **3.1. GENERAL**

- .1 See drawing details for sealant locations.
- .2 Sealants only to be applied where indicated in drawings or as directed by Contract Administrator in writing.

### **3.2. PROTECTION**

- .1 Protect installed Work of other trades from staining or contamination.

### **3.3. 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.

**3.4. 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.

**3.5. 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.

**3.6. APPLICATION**

- .1 Sealant.
  - .1 Apply sealant in accordance with manufacturers 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, and 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.

**3.7. CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Clean adjacent surfaces immediately and leave Work neat and clean.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 35 20 – LEED Sustainable Requirements and Section 01 74 19 – Waste Management and Disposal.

**END OF SECTION.**