

**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
  - .2 ASTM C209 – Standard Test Methods for Cellulosic Fiber Insulating Board
  - .3 ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - .4 ASTM C578 - 12b Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  - .5 ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  - .6 ASTM D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
  - .7 ASTM E96 – Standard Test Method for Water Vapor Transmission of Materials
  - .8 ASTM D1623 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
  - .9 ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .2 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2, Propane Storage and Handling Code.
- .3 Canadian General Standards Board (CGSB).
  - .1 CGSB 71-GP-24M, Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
  - .2 CAN/CGSB 51.26-M86,
- .4 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .2 CAN/ULC-S702, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
  - .3 CAN/ULC-S704, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

**1.2                SUBMITTALS**

- .1 Product Data:
  - .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. Indicate VOC's insulation products and adhesives.
- .2 Manufacturer's Instructions: Submit manufacturer's installation instructions.

**Part 2 Products**

**2.1 BOARD INSULATION**

- .1 Expanded polystyrene (EPS) roof insulation:
  - .1 To CAN/ULC S701, Type 2, Expanded polystyrene insulation board.
  - .2 Compressive strength: to ASTM D1621, minimum 30 Psi.
  - .3 Board size: 610 mm x 2440 mm and 1220 x 2440mm, thickness as indicated, tapered to provide slope, joints sealed.
  - .4 Thermal resistance: R 4.0/inch [0.70 RSI/inch] (RSI Value - m2 K/W for 25.4 mm at 75 °F/24°C)
  - .5 Manufacturer and Product
    - .1 Plasti-Fab PLASTISPAN Insulation
  - .6 Thicknesses:
    - .1 As indicated, tapered to provide slope (refer to drawings)
- .2 Mineral fibre roof underlayment board:
  - .1 Rigid mineral fibre (rock wool) support panel with a homogenous density with impregnated with a bitumen layer which is compatible with roof membrane system.
  - .2 To CAN/ULC-S107-03 and CAN/ULC-S126-06
  - .3 Compressive Strength: to ASTM C 165, @ 10%, 12 Psi @ 25% 28 Psi
  - .4 Density: to ASTM C 612-09, 200 kg/m3 (12.5 lb/ft3)
  - .5 Dimensional Stability: ASTM C 356, 1.1% (Linear Shrinkage 24 hours at 1200 °F (650 °C))
  - .6 Water Absorption: ASTM C 209, < 1.0 %
  - .7 Water Vapor Sorption: ASTM C 1104, 0.29 %
  - .8 Board size: 1200 mm x 1200 mm (4 feet x 4 feet)
  - .9 Thermal resistance: R 4.0/inch [0.70 RSI/inch] (RSI Value - m2 K/W for 25.4 mm at 75 °F/24°C)
  - .10 Manufacturer and Product
    - .1 Soprema SOPRAROCK MD PLUS
  - .11 Thicknesses:
    - .1 26.4mm (1.04 inches)
- .3 Extruded polystyrene (EPS) for all areas not described otherwise:
  - .1 To CAN/ULC S701, Type 2, Expanded polystyrene insulation board.
  - .2 Compressive strength: to ASTM D1621, minimum 30 Psi.
  - .3 Board size: 610 mm x 2440 mm and 1220 x 2440mm, thickness as indicated, joints sealed.
  - .4 Thermal resistance: R 4.0/inch [0.70 RSI/inch] (RSI Value - m2 K/W for 25.4 mm at 75 °F/24°C)
  - .5 Manufacturer and Product
    - .1 Plasti-Fab PLASTISPAN Insulation
  - .6 Thicknesses:
    - .1 As indicated (refer to drawings)

**2.2 SUBSTITUTIONS:**

- .1 In accordance with B7.

**2.3 ADHESIVE**

- .1 Adhesive to manufacturer's written recommendations.

**2.4 ACCESSORIES**

- .1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
- .2 Joint sealing tape: air resistant pressure sensitive adhesive tape as recommended by insulation manufacturer.

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

- .1 Install insulation accordance with manufacturer's recommendations.
- .2 Install insulation boards horizontally. Offset vertical joints minimum 300 mm.
- .3 Over plywood sheathing and stud framing at 406 mm o.c., locate vertical joints at mid-point between studs.
- .4 Install tightly against dry substrate. Provide continuity of thermal protection to building elements and spaces.
- .5 Carefully inspect for continuity of air barrier prior to placement of insulation.
- .6 Cut and trim insulation neatly to fit around corners and penetrations. Take care to prevent cutting sheet membrane air and vapour seal.
- .7 Butt joints tightly. Deform board edges as required to maintain tight butt joints at insulation fasteners and other penetrations located at board joints.

### **3.5 INSTALLATION OF FASTENERS**

- .1 Secure all above grade and partially above grade insulation boards with fasteners, anchored to substrates capable of providing specified fastener pull-out performance.
- .2 Install fasteners following fastener manufacturer's recommendations for type of substrate, drill bits, edge distance, installation methods, and ambient and substrate temperature conditions.
- .3 Space fasteners horizontally at:
  - .1 maximum 800 mm o.c., and
  - .2 minimum 100 mm and maximum 200 mm from vertical board joints.
- .4 Space fasteners vertically:
  - .1 at all horizontal board joints and on centre line of board widths, or
  - .2 at 1/4 of board width from all horizontal joints
- .5 Do not use plastic fasteners in horizontal, suspended installations.

### **3.6 PERIMETER FOUNDATION INSULATION**

- .1 Exterior application: Install on exterior face of concrete with fastening clips and cap flashing in accordance with manufacturer's installation guidelines. Extend boards as indicated on earth.

### **3.7 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials, (ASTM).
  - .1 ASTM C165, Test for Measuring Compressive Properties of Thermal Insulations
  - .2 ASTM C423, Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - .3 ASTM C518, Standard Method for Test for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - .4 ASTM C553, Specification for Mineral (Glass) Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .5 ASTM C665, Specification for Mineral (Glass) Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - .6 ASTM C1104, Test Method for Determining the Water Vapour Sorption of Unfaced Mineral Fibre Insulation.
  - .7 ASTM C1320, Standard Practice for Installation of Mineral (Glass) Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
  - .8 ASTM C1338, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- .2 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1HB, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2, Propane Storage and Handling Code.
- .3 Canadian Standards Association (CSA International).
  - .1 CSA B111, Wire Nails, Spikes and Staples.
- .4 National Research Council (NRC) of Canada, Institute for Research in Construction (IRC) – Canadian Construction Materials Centre (CCMC):
  - .1 CCMC Product Listing Number 05650-L
  - .2 Summary Report for Consortium on Gypsum Board Walls: Sound Transmission Results, Internal Report IRC-IR-693
  - .3 Gypsum Board Walls: Transmission Loss Data, Internal Report IRC-IR-761
  - .4 Summary Report for Consortium on Floors: Sound Transmission Class and Impact Insulation Results, Internal Report IRC-IR-766
- .5 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S702, Thermal Insulation, Mineral (Glass) Fibre, for Buildings
  - .2 CAN/ULC-S102, Standard Method for Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .3 CAN/ULC-S102.2, Standard Method for Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
  - .4 CAN4-S114, Standard Method for Test for Determination of Non-Combustibility in Building Materials
  - .5 CAN/ULC-S604, Type A Chimneys

## 1.2 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions: Submit manufacturer's installation instructions.

## Part 2 Products

### 2.1 INSULATION

- .1 Thermal batt and blanket mineral fibre for exterior walls:
  - .1 Non-combustible, lightweight, semi-rigid mineral wool batt insulation to CSA/ULC-S702, Type 1, RSI 0.71 per 25 mm, size and thickness as indicated on drawings.
    - .1 Acceptable Material: ROXUL Inc., ROXUL COMFORTBATT™.
  - .2 Acoustic batt insulation:
    - .1 Non-combustible lightweight, semi-rigid mineral wool batt insulation to ASTM C612 that provides fire resistance to ASTM E136 and sound control to ASTM C423, size and thickness as indicated on drawings.
      - .1 Acceptable Material: ROXUL Inc., ROXUL SAFE™.

### 2.2 SUBSTITUTIONS:

- .1 In accordance with B7.

## Part 3 Execution

### 3.1 WORKMANSHIP - GENERAL

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Examine existing conditions: ensure adjacent and support materials and products are dry and ready to receive insulation, and that mechanical and electrical services to be covered by the insulation have been inspected.
- .3 Do not commence installation until base work has been corrected and inspections completed.

### 3.2 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and for sound attenuation as noted on drawings.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.

- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls and CSA B149.1 and CSA B149.2 Type B and L vents.
- .5 Do not enclose insulation until it has been inspected and approved by Contact Administrator.

**3.3 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        Canadian Urethane Foam Contractors' Association Inc. (CUFCA)
- .2        Underwriters' Laboratories of Canada (ULC)
  - .1        CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.
  - .2        CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .3        CAN/ULC-S705.1, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.
  - .4        CAN/ULC-S705.2, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

**1.2                TEST REPORTS**

- .1        Submit test reports, verifying qualities of foam sealant meet or exceed requirements of this specification.
- .2        Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

**1.3                QUALITY ASSURANCE**

- .1        Applicators to conform to CUFCA Quality Assurance Program.

**1.4                SAFETY REQUIREMENTS**

- .1        Protect Workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
- .2        Workers must wear gloves, respirators, dust masks, eye protection, protective clothing when applying foam sealant.
- .3        Workers must not eat, drink or smoke while applying foam sealant.

**1.5                PROTECTION**

- .1        Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.
- .2        Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hours after application to maintain non-toxic, unpolluted, safe Working conditions.
- .3        Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .4        Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .5        Dispose of waste foam sealant daily in location designated by Contract Administrator and decontaminate empty drums in accordance with foam sealant manufacturer's instructions.



## **1.6 ENVIRONMENTAL REQUIREMENTS**

- .1 Apply foam sealant only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

## **1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Low expanding, one-component, polyurethane foam sealant, curing to a semi-rigid, closed cell urethane foam providing a RSI of 0.9 per 25.4 mm. To meet the following physical properties:
  - .1 Density: 25.7 kg/m<sup>3</sup>
  - .2 Compressive Strength Parallel @ 10%: 69-96 psi
  - .3 Tensile Strength: 103 psi
  - .4 Water Vapour Transmission: 5.97 perms
  - .5 Flame Spread: 20
  - .6 Smoke Development: 70

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Apply foam sealant to clean surfaces in accordance manufacturer's printed instructions. Surfaces to be free of dust, dirt, oil and other foreign materials.
- .2 Cover surfaces not intended to be foamed.
- .3 Apply foam sealant to perimeter of openings indicated and to thickness as recommended by manufacturer. Trim excess cured foam from finished area.
- .4 Apply appropriate self-adhered or other membranes to opening perimeter to ensure continuity of air and vapour barrier system.
- .5 Install sealant with foam backer rod on interior and exterior side of low expanding foam installation as indicated to ensure continuity of air and vapour barrier system.

- .6 Cover exposed urethane foam sealants to protect from adverse effects from ultraviolet light (sunlight).

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM D1709 - 09 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
  - .2 ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
  - .3 ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
  - .4 ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
  - .5 ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
  - .6 ASTM F1249-01 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .3 Underwriters Laboratories Canada (ULC)
  - .1 CAN/ULC S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

**1.2 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include:
  - .1 Product characteristics.
  - .2 Performance criteria.
  - .3 Limitations.

**1.3 QUALITY ASSURANCE**

- .1 Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.
- .2 Obtain vapor retarder materials from a single manufacturer regularly engaged in manufacturing the product.
- .3 Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

**1.4 MOCK UPS**

- .1 Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box. Mock-up may be part of finished work.

- .2 Mock-up will be used to judge workmanship, substrate preparation, and material application.
- .3 Allow two (2) working days for inspection of mock-up by Contract Administrator before proceeding with vapour barrier work.
- .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

## 1.5 QUALIFICATIONS

- .1 Applicator: Company specializing in performing work of this section with minimum 5 years documented experience with installation of air/vapour barrier systems. Complete installation must be approved by the material manufacturer.
- .2 Applicator: Company who is currently licensed by certifying organization must maintain their license throughout the duration of the project.

## 1.6 PRE- INSTALLATION MEETINGS

- .1 Convene one week prior to commencing work of this section.

## Part 2 Products

### 2.1 SHEET VAPOUR RETARDER

- .1 Vapour retarder membrane for interior use:
  - .1 Polyethylene film: to CAN/CGSB-51.34, 0.15mm 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 Vapour retarder membrane for under-slab applications: shall be
  - .1 Vapour retarder membrane manufactured from virgin polyolefin resins, and when tested according to all requirements of ASTM E1745, shall meet the following minimum performance requirements:
    - .1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12,13, by ASTM E96, Method B or ASTM F1249).
      - .1 As received: 0.0183 perms.
      - .2 After Wetting and Drying: 0.0210 perms.
      - .3 Resistance to Plastic Flow and Temperature: 0.0197 perms.
      - .4 Effect Low Temperature and Flexibility: 0.0212 perms.
      - .5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0198 perms.
    - .2 Puncture Resistance (ASTM D1709): 4,394 grams.
    - .3 Tensile Strength ASTM E154, Section 9: 52 Lb. Force/Inch.
    - .4 Acceptable Manufacturer and Product: PERMINATOR 10 mil by W. R. MEADOWS.

### 2.2 SUBSTITUTIONS:

- .1 In accordance with B7.

## **2.3 ACCESSORIES**

- .1 Joint sealing tape for interior use: 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.
- .2 Seam Tape for under-slab use: high density polyethylene tape with pressure sensitive adhesive. Minimum width 100 mm.
- .3 Sealant for interior use: compatible with vapour retarder, recommended by vapour retarder manufacturer, to Section 07 92 00 - Joint Sealants.
- .4 Staples: minimum 6 mm leg.
- .5 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.
- .6 Pipe Collars: construct pipe collars from appropriate vapour retarder material and pressure sensitive tape according to manufacturer's instructions.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Examine surfaces to receive membrane. Notify Contact Administrator if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### **3.2 INSTALLATION**

- .1 Ensure services are installed and inspected prior to installation of retarder.
- .2 Install sheet vapour retarder on warm side of exterior wall, ceiling, assemblies prior to installation of gypsum board to form continuous retarder.
- .3 Install sheet vapour retarder on granular base (floors only).
- .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.

### **3.3 EXTERIOR SURFACE OPENINGS**

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

### **3.4 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.

### **3.5 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.

### **3.6 ELECTRICAL BOXES**

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
  - .1 Install moulded box vapour barrier or wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.
  - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

### **3.7 CLEANING**

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

### **3.8 FIELD QUALITY CONTROL**

- .1 Do not cover Work of this Section until testing and/or inspection is accepted.
- .2 Contract Administrator will review within 2 working days of the notification of work performed.
- .3 If the inspections reveal any defects, promptly remove and replace defective work at no additional cost to the Contract Administrator.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
  - .2 ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
  - .3 ASTM E283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - .4 E1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
  - .5 ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - .6 ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
  - .7 ASTM E96: Water Vapour Transmission of Materials.
- .3 National Building Code of Canada (NBCC)
  - .1 NBCC, Part 5 - Environmental Separation
- .4 Sealant and Waterproofers Institute - Sealant and Caulking Guide Specification.

**1.2 SUBMITTALS**

- .1 Submit documentation from an approved independent testing laboratory certifying the air leakage and vapour permeance rates of the air barrier membranes, including primary membrane and transition sheets in accordance with ASTM E2178.
  - .1 Test report submittals shall include test results on porous substrate and include sustained wind load and gust load air leakage results.
- .2 Submit copies of manufacturers' current ISO certification.
- .3 Submit manufacturers' current product data sheets for the air barrier membrane system.

**1.3 QUALITY ASSURANCE**

- .1 Submit document stating the applicator of the primary air/vapour barrier membranes specified in this section is qualified by the manufacturer as suitable for the execution of the Work.
- .2 Perform Work in accordance with manufacturer's written instructions and this specification.
- .3 Maintain one copy of manufacturer's written instructions on site.

- .4 Allow access to Work site by the air barrier membrane manufacturer's representative.
- .5 Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, and adhesives.

#### **1.4 QUALIFICATIONS**

- .1 Applicator: Company specializing in performing work of this section with minimum 5 years documented experience with installation of air/vapour barrier systems. Complete installation must be approved by the material manufacturer.
- .2 Applicator: Company who is currently licensed by certifying organization must maintain their license throughout the duration of the project.

#### **1.5 PRE- INSTALLATION MEETINGS**

- .1 Convene one week prior to commencing work of this section.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions. Deliver membrane materials in factory wrapped packaging indicating name of manufacturer and product.
- .3 Avoid spillage. Immediately notify Contract Administrator if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.
- .5 Store roll materials on end in original packaging.
- .6 Store primers at temperatures of 5°C and above to facilitate handling. Keep solvent away from open flame and excessive heat.

#### **1.7 PROJECT ENVIRONMENTAL REQUIREMENTS**

- .1 Do not install solvent curing sealants or vapour release adhesive materials in enclosed spaces without ventilation.
- .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

#### **1.8 WARRANTY**

- .1 Provide a written warranty for work of this section from Manufacturer for failure due to defective materials and from contractor for failure due to defective installation workmanship for ten (10) years respectively.
- .2 Include coverage of installed sealant and sheet materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion or do not cure.



**Part 2 Products**

**2.1 SELF ADHERED AIR/VAPOUR BARRIER MEMBRANES FOR WALLS**

- .1 Primary sheet air/vapour barrier membrane shall be Blueskin® SA manufactured by Henry-Bakor, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. For application temperatures down to -12°C use Blueskin® SA LT. Membrane shall have the following physical properties:
  - .1 Thickness: 1.0 mm (40 mils),
  - .2 Air leakage: <0.005 L/s.m<sup>2</sup> @ 75 Pa to ASTM E283-91,
  - .3 Tested to ASTM E 2357 for the air barrier assembly,
  - .4 Water vapour permeance: 1.6 ng/Pa.m<sup>2</sup>.s (0.03 perms) to ASTM E96,
  - .5 Low temperature flexibility: -30 °C to CGSB 37-GP-56M,
  - .6 Elongation: 200% to ASTM D412-modified.
- .2 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 degrees C min. to ASTM D5147 (resistance to flow),
  - .3 Thickness: 1.0 mm (40 mils),
  - .4 Air leakage: <0.005 L/s.m<sup>2</sup> @ 75 Pa to ASTM E283-91,
  - .5 Water vapour permeance: 1.6 ng/Pa.m<sup>2</sup>.s (0.03 perms) to ASTM E96,
  - .6 Low temperature flexibility: -30 °C to CGSB 37-GP-56M.
- .3 Adhesive for self-adhering membranes at temperatures above -12°C shall be Blueskin® Adhesive manufactured by Henry-Bakor, a synthetic rubber based adhesive, quick setting, having the following physical properties:
  - .1 Colour: Blue,
  - .2 Weight: 0.8 kg/l,
  - .3 Solids by weight: 35%,
  - .4 Drying time (initial set): 30 minutes.
- .4 Primer for self-adhering membranes at temperatures above -4 degrees C shall be Aquatac™ Primer manufactured by Henry-Bakor, a polymer emulsion based adhesive, quick setting, having the following physical properties:
  - .1 Colour: Aqua,
  - .2 Weight: 1.0 kg/l,
  - .3 Solids by weight: 53%,
  - .4 Water based, no solvent odours,
  - .5 Drying time (initial set): 30 minutes at 50%RH and 20 degrees C.
- .5 Adhesive for self-adhering membranes at temperatures above -12°C shall be Blueskin® LVC Adhesive a quick drying, lower volatile organic compound (VOC) formulation, rubber based adhesive designed to enhance the adhesion of self-adhesive membranes such as Blueskin®
  - .1 Colour: Blue
  - .2 Weight:: 0.9 kg/l

- .3 Solids By Weight: 40%
- .4 VOC Content: < 250 g / L
- .5 Drying Time (initial set): Approximately 30 minutes.
- .6 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, 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.
- .7 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 25mm wide.
  - .7 For use in concealed or exposed application.
- .8 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 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions.

## **2.2 SELF ADHERED AIR BARRIER MEMBRANES FOR WALLS**

- .1 Primary water resistive air barrier membrane shall be BlueskinVP™ 160 manufactured by Henry; a self-adhering air barrier membrane with an engineered film specifically designed to be water resistant and vapor permeable. Membrane shall have the following physical properties:
  - .1 Air leakage: <0.004 CFM/ft<sup>2</sup> @ 1.57 lbs/ft<sup>2</sup> [<0.02L/s/m<sup>2</sup> @ 75Pa] when tested in accordance with ASTM E2178,
  - .2 Water Vapor Permeance: 29 perms to ASTM E96, Method B,
  - .3 Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies,
  - .4 Resistance to Water Penetration: Pass ICC-ES AC 38
  - .5 Water Penetration Resistance around Nails: Pass when tested to AAMA 711-05 & ASTM D 1970 modified,
  - .6 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84: Flame Spread Rating of 0 and Smoke Development Classification of 105,

- .7 Basis Weight: Minimum 160 gm/m<sup>2</sup>, when tested in accordance with TAPPI Test Method T-410,
  - .8 Tensile Strength: 40 lbF MD and 29 lbF CD per ASTM D828,
  - .9 Average Dry Breaking Force: 127 lbF MD, and 91 lbF CD per ASTM D 5034,
  - .10 Cyclic and Elongation: Pass at 100 cycles, -29 degrees C (-20 degrees F) per ICC-ES AC 48
- .2 Self-adhering membrane for window sill pan flashings shall be Blueskin® SA, LT, or HT manufactured by Henry; an SBS modified bitumen, self-adhering sheet membrane which is integrally laminated to a blue polyethylene film. Membrane shall have the following physical properties:
- .1 Peel Adhesion to Primed Steel 15.0 to ASTM D 1000
  - .2 Vapour Permeance: < 0.014 perms to ASTM E 96
  - .3 Membrane Thickness: 0.0443 inches (45 mils)
  - .4 Low temperature flexibility: -15 degrees F to ASTM D146 min
  - .5 Elongation: 40% to ASTM D412-modified min
- .3 Self-adhering membrane for all window jambs, headers, door openings, inside and outside corners, and other transitions shall be pre-cut BlueskinVP™ 160 manufactured by Henry; a self-adhering sheet air barrier membrane with an engineered film specifically designed to be water resistant and vapor permeable. Membrane shall have the following physical properties:
- .1 Water Vapor Permeance: 29 perms to ASTM E96, Method B,
  - .2 Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies,
  - .3 Resistance to Water Penetration: Pass ICC-ES AC 38,
  - .4 Water Penetration Resistance around Nails: Pass when tested to AAMA 711-05 & ASTM D 1970 modified,
  - .5 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84: Flame Spread Rating of 0 and Smoke Development Classification of 105,
  - .6 Basis Weight: Minimum 160 gm/m<sup>2</sup>, when tested in accordance with TAPPI Test Method T-410,
  - .7 Tensile Strength: 40 lbF MD and 29 lbF CD per ASTM D828,
  - .8 Average Dry Breaking Force: 127 lbF MD, and 91 lbF CD per ASTM D 5034,
  - .9 Cyclic and Elongation: Pass at 100 cycles, -29 degrees C (-20 degrees F) per ICC-ES AC 48
- .4 Through-wall flashing membrane (Self-Adhering) shall be Blueskin® TWF manufactured by Henry; an SBS modified bitumen, self-adhering (Yellow) sheet membrane complete with a cross-laminated polyethylene film. Membrane shall have the following physical properties:
- .1 Membrane Thickness: 0.0394 inches (40 mils),
  - .2 Film Thickness: 4.0 mils,
  - .3 Flow (ASTM D5147): Pass @ 212 degrees F,
  - .4 Puncture Resistance: 134 lbf to ASTM E 154,
  - .5 Tensile Strength (film): 5723 psi ASTM D882,
  - .6 Tear Resistance: 13lbs. MD to ASTM D1004,
  - .7 Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M
- .5 Low VOC adhesive primer for primary self-adhering water resistive air barrier membrane, self-adhering transition membrane and SBS modified bitumen membranes at all temperatures shall be Blueskin® LVC Adhesive as supplied by Henry; a low V.O.C. quick

setting rubber based adhesive. Adhesive Primer shall have the following physical properties:

- .1 Weight: 7.68 lbs/gal,
  - .2 Solids by weight: 40%,
  - .3 Max. V.O.C. <240 grams/liter,
  - .4 Drying time (initial set): 30 minutes at 50% RH and 70 degrees F
- .6 Adhesive Primer for primary self-adhering water resistive air barrier membrane, self-adhering transition membrane and SBS modified bitumen membranes in non-regulated VOC areas, at all temperatures shall be Blueskin® Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:
- .1 Color: Blue,
  - .2 Weight: 6 lbs/gal,
  - .3 Solids by weight: 35%,
  - .4 Drying time (initial set): 30 minutes
- .7 Termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:
- .1 Compatibility: With air barrier membrane, substrate and insulation,
  - .2 Air leakage: 0.0026 CFM/ft<sup>2</sup> @ 2.1 lbs/ft<sup>2</sup> to ASTM E283,
  - .3 Water vapour permeance: 0.03 perms to ASTM E96,
  - .4 Long term flexibility: CGSB 71-GP-24M

## 2.3 SPUNBONDED SHEET BARRIERS

- .1 Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® (or approved equal in accordance with B7) and related assembly components.
- .1 Performance Characteristics:
    - .1 Air Penetration: 0.001 cfm/ft<sup>2</sup> at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft<sup>2</sup> at 75 Pa, when tested in accordance with ASTM E2357
    - .2 Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
    - .3 Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.
    - .4 Basis Weight: 2.7 oz/yd<sup>2</sup>, when tested in accordance with TAPPI Test Method T-410.
    - .5 Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
    - .6 Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
    - .7 Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
    - .8 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 10, Smoke Developed: 10.
  - .2 Accessories

- .1 Seam Tape: 3 inch wide, DuPont™ Tyvek® Tape (or approved equal in accordance with B7) for commercial applications.
- .3 Fasteners:
  - .1 Steel Frame Construction: DuPont™ Tyvek® Wrap Cap Screws , as distributed by DuPont (or approved equal in accordance with B7): 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4" or 2" metal gasketed washer
  - .2 Wood Frame Construction: Tyvek® Wrap Caps, as distributed by DuPont (or approved equal in accordance with B7): #4 nails with large 1-inch plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8-inch into the wood stud.
  - .3 Masonry Construction: Masonry tap-con fasteners with Tyvek® Wrap Caps as distributed by DuPont (or approved equal in accordance with B7): 2-inch diameter plastic cap fasteners.
- .4 Sealants:
  - .1 Provide sealants in accordance with Section 07 92 00 - Joint Sealants and as per manufacturers recommendations.
- .5 Adhesives:
  - .1 Provide adhesive as recommended by manufacturer.
- .6 Primers:
  - .1 Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
- .7 Flashing:
  - .1 DuPont™ FlexWrap™, as distributed by DuPont (or approved equal in accordance with B7): flexible membrane flashing materials for window openings and penetrations.
  - .2 DuPont™ StraightFlash™, as distributed by DuPont (or approved equal in accordance with B7): straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
  - .3 DuPont™ StraightFlash™ VF, as distributed by DuPont (or approved equal in accordance with B7): dual-sided straight flashing membrane materials for brick mold and non-flanged windows and doors.
  - .4 DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge (or approved equal in accordance with B7): Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
  - .5 Preformed Inside and Outside Corners and End Dams as distributed by DuPont (or approved equal in accordance with B7): Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.
- 2.4 SUBSTITUTIONS:**
  - .1 In accordance with B7.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .2 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane. Strike masonry joints flush.
- .3 Where curing compounds are used they must be clear resin based without oil, wax or pigments.
- .4 Do not proceed with application of air barrier membrane when rain is expected within 24 hours.
- .5 Condition materials to room temperature prior to application to facilitate handling.

**3.2 PREPARATION**

- .1 Surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane.
- .2 New concrete should be cured for a minimum of 14 days and must be dry before air/vapour barrier membranes are applied.
- .3 Ensure all preparatory Work is complete prior to applying primary air/vapour barrier membrane.
- .4 Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.
- .5 Apply adhesive or primer for self-adhering membranes at rate recommended by manufacturer.
- .6 Apply to all areas to receive transition sheet and / or through-wall flashing membrane, as indicated on drawings by roller or spray and allow minimum 30 minute open time. Surfaces not covered by self-adhering transition membrane or self-adhering through-wall flashing membrane during the same working day must be re-applied.
- .7 For the application of SBS modified self-adhering window sill pan flashings, through-wall flashings and other applications of SBS modified self-adhering transition membranes, the substrate needs to be conditioned with applicable adhesive primer.
- .8 Apply adhesive primer at rate recommended by manufacturer to all areas to receive SBS modified self-adhering sheet membrane as indicated on drawings by roller or spray and allow to dry.
- .8 For applications of SBS modified self-adhered membranes installed over the primary self-adhered water resistive air barrier membrane, the surface of the primary self-adhered water resistive air barrier membrane must be primed and allowed to cure prior to the placement of the SBS modified self-adhered membrane.

### 3.3 INSTALLATION – SELF ADHERED AIR/VAPOUR BARRIER MEMBRANES FOR WALLS

- .1 Inside and outside corners
  - .1 Seal inside and outside corners of sheathing boards with a strip of self-adhering air/vapour barrier membrane extending a minimum of 3 inches on either side of the corner detail.
    - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
    - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
    - .3 Roll all laps and membrane with a counter top roller to ensure seal.
- .2 Transition areas:
  - .1 Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air/vapour barrier membrane.
    - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
    - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
    - .3 Ensure minimum 2 inch overlap at all end and side laps of membrane.
    - .4 Roll all laps and membrane with a counter top roller to ensure seal.
- .3 Windows and rough openings
  1. Wrap rough openings with self-adhered air/vapour barrier membrane as detailed.
    - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
    - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
    - .3 Roll all laps and membrane with a counter top roller to ensure seal.
- .4 Through-wall flashing membrane
  - .1 Apply through-wall flashing membrane along the base of masonry veneer walls and over shelf angles as detailed.
    - .1 Prime surfaces and allow to dry, press membrane firmly into place, overlap minimum 2 inches at all end and side laps. Promptly roll all laps and membrane to ensure the seal.
    - .2 Applications shall form a continuous flashing membrane and shall extend up a minimum of 8 inches up the back-up wall.
    - .3 Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.
    - .4 Install through-wall flashing membrane and extend 1/2 inch from outside edge of veneer. Provide end dam flashing as detailed.
- .5 Primary air/vapour barrier

1. Apply self-adhering 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 all vertical joints.
  - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
  - .2 Align and position self-adhering air/vapour barrier membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
  - .3 Roll all laps and membrane with a counter top roller to ensure seal.
  - .4 At the end of each day's work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel apply a feathered edge to seal termination and shed water.

### 3.4 INSTALLATION – SELF ADHERED AIR BARRIER MEMBRANES FOR WALLS

- .1 Inside and outside corners
  - .1 Seal inside and outside corners of sheathing boards with a strip of self-adhering vapor permeable membrane extending a minimum of 3 inches on either side of the corner detail.
    - .1 For inside corners, pre-treat the corner with a continuous ½ inch bead of termination sealant.
    - .2 Prime surfaces in an intermittent pattern, at a rate of 200-250 sq ft/gal where appropriate to achieve surface adhesion as per manufacturers' instructions and allow to dry.
    - .3 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all side laps and minimum 3 inches overlap at all end laps of membrane.
    - .4 Roll all laps and membrane with a counter top roller to ensure seal.
- .2 Transition areas:
  - .1 Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering water resistive air barrier transition membrane.
    - .1 Prime surfaces in an intermittent pattern, at a rate of 200-250 sq ft/gal where appropriate to achieve surface adhesion as per manufacturers' instructions and allow to dry.
    - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
    - .3 Ensure minimum 2 inches overlap at all side laps and minimum 3 inches overlap at all end laps of membrane.
    - .4 Roll all laps and membrane with a counter top roller to ensure seal.
- .3 Windows and rough openings
  - .1 Place specified SBS modified self-adhering window sill pan flashing membrane across window sills. Pre-treat inside corners with a bead of termination sealant. Install window sill pan membrane and end dam terminations, seal cuts and terminations with termination sealant.
  - .2 Wrap jamb of rough openings with specified self-adhering water resistive air barrier transition membrane as detailed.



- .3 Extend specified self-adhering water resistive air barrier membrane into rough window openings sufficient to provide a connection to interior vapor retarder.
  - .1 Prime surfaces in an intermittent pattern, at a rate of 200-250 sq ft/gal where appropriate to achieve surface adhesion as per manufacturers' instructions and allow to dry.
  - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all side laps and minimum 3 inches overlap at all end laps of membrane.
  - .3 Roll all laps and membrane with a counter top roller to ensure seal.
  
- .4 Through-wall flashing membrane
  - .1 Apply through-wall flashing membrane along the base of masonry veneer walls and over shelf angles as detailed.
    - .1 Prime surfaces and allow to dry, press membrane firmly into place, overlap minimum 2 inches at all end and side laps. Promptly roll all laps and membrane to ensure the seal.
    - .2 Applications shall form a continuous flashing membrane and shall extend up a minimum of 8 inches up the back-up wall.
    - .3 Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.
    - .4 Install through-wall flashing membrane 1/2 inch from outside edge of veneer. Provide "end dam" flashing as detailed.
  
- .5 Primary air barrier
  - .1 Apply self-adhering water resistive air barrier membrane complete and continuous to substrate in a sequential overlapping weatherboard method starting at bottom or base of wall and working up in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.
    - .1 Cut to manageable sections, align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.
    - .2 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.
    - .3 Ensure minimum 3 inch overlap at all ends and 2 inch side laps of subsequent membrane applications.
    - .4 Pressure roll all membrane surfaces, laps and flashings with a counter top roller or 'J-roller' to ensure appropriate surface adhesion.
    - .5 At the end of each days work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel-apply a feathered edge to seal termination and shed water.

### **3.5 INSTALLATION - SPUNBONDED SHEET BARRIERS**

- .1 Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
- .2 Install weather barrier prior to installation of windows and doors.

- .3 Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- .4 Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- .5 Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- .6 Window and Door Openings: Extend weather barrier completely over openings.
- .7 Overlap weather barrier
  - .1 Exterior corners: minimum 12 inches.
  - .2 Seams: minimum 6 inches.
- .8 Weather Barrier Attachment:
  - .1 Steel or Wood Frame Construction: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
  - .2 Masonry Construction: Attach weather barrier to masonry. Secure using weather barrier manufacturer recommended fasteners, spaced 12-18 inches vertically on center and 24 inches maximum horizontally. Weather barrier may be temporarily attached to masonry using recommended adhesive, placed in vertical strips spaced 24 inches on center, when coordinated on the project Site.
- .9 Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ or weather barrier manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.
- .10 Seaming:
  - .1 Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
  - .2 Seal any tears or cuts as recommended by weather barrier manufacturer.
- .11 Opening Preparation (for use with non-flanged windows – all cladding types)
  - .1 Flush cut weather barrier at edge of sheathing around full perimeter of opening.
  - .2 Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.
- .12 Flashing (for use with non-flanged windows – all cladding types)
  - .1 Cut [7-inch] [9-inch] wide DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.
  - .2 Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by Working in along the sill before adhering up the jambs.
  - .3 Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanical fastening is not required for DuPont™ FlexWrap™ NF.

- .4 Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start DuPont™ StraightFlash™ at head of opening and lap sill flashing down to the sill.
  - .5 Spray-apply primer to top 6 inches of jambs and exposed sheathing.
  - .6 Install DuPont™ FlexWrap™ DuPont™ FlexWrap™ NF at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
  - .7 Coordinate flashing with window installation.
  - .8 On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.
  - .9 Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
  - .10 Tape top of window in accordance with manufacturer recommendations.
  - .11 On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.
- .13 Thru-Wall Flashing Installation
- .1 Apply primer per manufacturer's written instructions.
  - .2 Install preformed corners and end dams bedded in sealant in appropriate locations along wall.
  - .3 Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.
  - .4 Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.
  - .5 Roll flashing into place. Ensure continuous and direct contact with substrate.
  - .6 Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.
  - .7 Thru-wall flashing / weather barrier interface at base of wall:
    - .1 Overlap thru-wall flashing with weather barrier by 6-inches.
    - .2 Mechanically fasten bottom of weather barrier through top of thru-wall flashing.
    - .3 Seal vertical and horizontal seams with tape or sealing membrane.
  - .8 Thru-wall flashing / weather barrier interface at shelf angle:
    - .1 Seal weather barrier to bottom of shelf angle with sealing membrane.
    - .2 Apply thru-wall flashing to top of shelf angle. Overlap thru-wall flashing with weather barrier by 6-inches.
    - .3 Seal bottom of weather barrier to thru-wall flashing with tape or sealing membrane.
  - .9 Thru-wall flashing / weather barrier interface at window head:
    - .1 Cut flap in weather barrier at window head.
    - .2 Prime exposed sheathing.
    - .3 Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.
    - .4 Install end dams bedded in sealant.
    - .5 Adhere 2 inches minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend ¼ inch minimum beyond outside edge of lintel to form drip edge.
    - .6 Apply sealant along thru-wall flashing edges.

- .7 Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.
- .8 Tape diagonal cuts of weather barrier.
- .9 Secure weather barrier flap with fasteners.

### **3.6 PROTECTION OF WORK**

- .1 Protect finished Work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.
- .3 Ensure finished Work is protected from climatic conditions.
- .4 Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.
- .5 Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.
- .6 Air/vapour barrier membrane is not designed for permanent exposure. Good practice calls for covering as soon as possible.

### **3.7 INSPECTION**

- .1 Carefully inspect for continuity of air barrier prior to placement of insulation.
- .2 Repair all deficient membrane areas.
- .3 Misaligned or inadequately lapped seams, punctures or other damage must be repaired with a patch of air barrier membrane extending 50mm in all directions from edge of damaged areas.
- .4 Cover membrane immediately after Contract Administrator's inspection to protect from damage by other trades.

### **3.8 TESTING**

- .1 Air leakage testing as directed by Contract Administrator and paid for by contractor will be performed by professional testing agency for the locations selected at random for penetrations, laps, corners, etc.
- .2 Testing will be witnessed by Contract Administrator and test reports will be signed by tester, site representative and contractor.
- .3 Inform Contract Administrator 48 hours prior to required testing.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM C36/C36M-[01], Standard Specification for Gypsum Wallboard.
  - .2 ASTM C726-[00a], Standard Specification for Mineral Fiber Roof Insulation Board.
  - .3 ASTM C728-[97e1], Standard Specification for Perlite Thermal Insulation Board.
  - .4 ASTM C 1177/C1177M-[01], Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .5 ASTM D41-[94(2002)e1], Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  - .6 ASTM D312-[00], Asphalt Used in Roofing.
  - .7 ASTM D448-[03], Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
  - .8 ASTM D2178-[97a], Asphalt Glass Felt Used in Roofing and Waterproofing.
  - .9 ASTM D6162-[00a], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  - .10 ASTM D6163-[00e1], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .11 ASTM D6164-[00], Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- .2 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-37.5-[M89], Cutback Asphalt Plastic Cement.
  - .2 CGSB 37-GP-9Ma-[83], Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  - .3 CGSB 37-GP-15M-[84], Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
  - .4 CGSB 37-GP-19M-[85], Cement, Plastic, Cutback Tar.
  - .5 CAN/CGSB-37.29-[M89], Rubber-Asphalt Sealing Compound.
  - .6 CGSB 37-GP-56M-[80b(A1985)], Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
  - .7 CAN/CGSB-51.33-[M89], Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .3 Canadian Roofing Contractors Association (CRCA).
  - .1 CRCA Roofing Specifications Manual-[1997].
- .4 Canadian Standards Association (CSA International).
  - .1 CAN/CSA-A123.3-[98], Asphalt Saturated Organic Roofing Felt.
  - .2 CAN/CSA-A123.4-[98], Asphalt for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
  - .3 CSA A231.1-[99], Precast Concrete Paving Slabs.
  - .4 CSA O121-[M1978(R1998)], Douglas Fir Plywood.
  - .5 CSA O151-[M1978(R1998)], Canadian Softwood Plywood.
- .5 Department of Justice Canada (Jus).

- .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .6 Factory Mutual (FM Global).
  - .1 FM Approvals - Roofing Products.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .8 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .9 Underwriters Laboratories' of Canada (ULC).
  - .1 CAN/ULC-S701-[01], Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S704-[2001], Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .3 CAN/ULC-S706-[02], Standard for Wood Fibre Thermal Insulation for Buildings.

## **1.2 PERFORMANCE REQUIREMENTS**

- .1 All waterproofing materials will be provided by the same manufacturer. Compatibility between components of roofing system is essential. Provide written declaration to Contract Administrator stating that materials and components, as assembled in system, meet this requirement.

## **1.3 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.

## **1.4 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.

### **1.5 STORAGE AND HANDLING**

- .1 All materials will be delivered and stored in conformance with the requirements described in the Manufacturer'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 +10°C 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 +5°C. 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.

### **1.6 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 1hour 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.

### **1.7 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.

### **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

### **1.9 WARRANTY**

- .1 The product manufacturer will issue a written and signed document in The City's name, certifying all product performance properties for a period of ten (10) years, starting from the date of acceptance. This warranty will cover the removal and replacement of defective roof membrane products, including labour. The warranty must remain a full warranty for the duration of the period specified. The scope of this warranty must not be limited by other system components manufactured or distributed by the membrane manufacturer. No letter amending the manufacturer's standard warranty will be accepted and the warranty certificate must reflect these requirements.
- .2 The Contractor will issue a written and signed document in The City's name, certifying that the Work executed will remain in place and free of any Workmanship defect for a period of Two years, starting from the date of acceptance.

## **Part 2 Products**

### **2.1 DECK COVERING**

- .1 Glass mat roof board: As specified in Section 06 16 43 – Gypsum Sheathing.

### **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 thermo-fusible 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

### 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 heat-welding.
- .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: COLVENT TRAFFIC CAP-860 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 FASTENERS (ROOFING, INSULATION, AND MEMBRANE)**

.1 #14 Phillips pre-assembled mechanical fasteners made of case-hardened carbon steel with a rust preventive coating that comply with FMR approval standards. 50 mm diameter, barbed stress plates that comply with the CSA B35.3 and FM 4470 approval standard.

.2 Acceptable materials: SOPRIFIX FASTENERS/PLATES by SOPREMA and as approved by FM for the specified system.

.3 Fastening: to FM system I90.

**2.9 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

**2.10 PREFABRICATED FLASHINGS**

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

**2.11 SEALERS**

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

**2.12 CARPENTRY**

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

**2.13 SUBSTITUTIONS**

- .1 In accordance with B7.

**Part 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 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.

### **3.6 INSULATION INSTALLATION**

- .1 Attach insulation mechanically in conformance with manufacturer's recommendations, and Factory Mutual standards 1-90 pertaining to number and placement of fasteners, namely Bulletin 1-28 for fastening to roof perimeters and corners.
- .2 Stagger all vertical joints between two rows of insulation board.

**3.7 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 selvage 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.
- .8 Install screws and washers every 300 mm c/c along the edge of the substrate.

**3.8 INSTALLATION OF PERIMETER BASE SHEETS WITH MECHANICAL FASTENERS**

- .1 Unroll a strip of membrane without adhering at the base of the parapets and upstands.
- .2 This base sheet membrane will be mechanically fastened using the anchoring patterns approved by Factory Mutual for the SOPRAFIX 1-90 system.
- .3 Fasten the base sheet membrane at one end, pull firmly on the membrane to stretch it flat, then install the appropriate anchors, proceeding toward the free end.
- .4 Just before installing the base sheet membrane on the field surface or on the upstands, remove the protection strip from each edge of the membrane to adhere the base sheet membrane to the perimeter membrane.
- .5 Seal the joints by torch welding a 300-mm-wide protection strip centred on the joint.
- .6 Avoid creating wrinkles, blisters, and fishmouths.

**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 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.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 The Aluminum Association Inc. (AA)
  - .1 Aluminum Sheet Metal Work in Building Construction-2000.
  - .2 AA DAF45-97, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials (ASTM International)
  - .1 ASTM A591/A591M-98, Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
  - .2 ASTM A606-01, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  - .3 ASTM A653/A653M-01a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .4 ASTM A792/A792M-02, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .5 ASTM B32-00 Standard Specification for Solder Metal.
  - .6 ASTM D523-89(1999), Standard Test Method for Specular Gloss.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual 1997.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  - .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  - .3 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
- .5 Canadian Standards Association (CSA International)
  - .1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
  - .2 CSA-A440-00/A440.1-00 - A440-00, Windows / Special Publication A440.1-00. User Selection Guide to CSA Standard A440-00, Windows.
  - .3 CSA B111-1974(R1998), Wire Nails, Spikes and Staples.

**1.2 SAMPLES**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, colour and finish products

**1.3 DELIVERY, STORAGE, AND HANDLING**

- .1 Storage and Handling Requirements:
  - .1 Store materials off ground and under cover in a dry, well ventilated enclosure.
  - .2 Stack preformed material in manner to prevent twisting, bending and rubbing.



- .3 Provide protection for galvanized and pre-painted surfaces.
- .4 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

#### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

### **Part 2 Products**

#### **2.1 SHEET METAL MATERIALS**

- .1 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with AZ150 coating, regular spangle surface, 0.70 mm (24 gauge) and 1.61 mm (16 gauge) base metal thicknesses. Pre-painted to CGSB –GP-71.

#### **2.2 PREFINISHED STEEL SHEET**

- .1 Prefinished sheet with factory applied polyvinylidene fluoride.
  - .1 Class F1S
  - .2 Colours:
    - .1 Colour as selected by Contract Administrator from manufacturer's standard range.
    - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
    - .4 Coating thickness: not less than 22 micrometres.
    - .5 Resistance to accelerated weathering for caulk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
      - .1 Outdoor exposure period 2500 hours.
      - .2 Humidity resistance exposure period 5000 hours.

#### **2.3 ACCESSORIES**

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3 unless noted otherwise.
- .4 Sealants: Section 07 92 00 – Joint Sealants.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

- .6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Touch-up paint: as recommended by prefinished material manufacturer.

## **2.4 FABRICATION, GENERALLY**

- .1 Fabricate metal flashings and other sheet metal Work in accordance with applicable CRCA 'FL' series details as indicated.
- .2 Fabricate aluminum flashings and other sheet aluminum Work in accordance with Aluminum Association Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. 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 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .7 Maximum Joint Spacing:
  - .1 Parapet Face Flashings: 1200 mm.
  - .2 Cap Flashing 300 mm and Greater in Width: 1200 mm.
  - .3 All Other Flashings: 2400 mm.
- .8 Construct flashing joints to allow for flashing movement, using flat "S" lock seams.
- .9 Maintain minimum of 22 mm lap at all joints. Provide 25 mm anchor projection of "S" locks.
- .10 At inside and outside corners, mitre the joint, and use upstanding seams, 25 mm minimum height and 22 mm minimum lap.
- .11 Maintain minimum 1:5 slope on horizontal surfaces of flashings, parapets and control joints.
- .12 Fabricate cap flashing to have a drip leg minimum 110 mm high.
- .13 Fabricate cap and counter flashings to lap 100 mm over base flashings.

## **2.5 FABRICATION, ROOF ACCESSORIES**

- .1 Form sheet steel roof drain sleeves, air-stops etc. from 0.70 mm (24 gauge) galvanized steel.
- .2 Form gum boxes from 0.70 mm (24 gauge) galvanized steel, with 75 mm minimum upstand and 100 mm one piece flanges. Solder joints. Make pans wider than member passing through roof membrane by 50 mm minimum all sides.

- .3 Fabricate roof scuppers from 0.70 mm (24 gauge), prepainted galvanized sheet steel with one piece deck flange, minimum 150 mm. Contour scuppers to cant strips.
- .4 Fabricate air/firestop below control joint box from 0.70 mm (24 gauge) galvanized steel.
- .5 Fabricate roof drain sleeves as detailed on drawings, from 0.70 mm (24 gauge) galvanized steel.

### **Part 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 PROTECTION OF EXISTING WORK**

- .1 Protect the Work of other Sections from damage by the Work of this Section.
- .2 Place protection to the requirements and satisfaction of this Section before performing the Work of other Sections.

#### **3.3 FLASHING INSTALLATION, GENERAL**

- .1 Install sheet metal Work in accordance with CRCA FL series details.
- .2 Install flashings not later than seven days after installation of the membrane on any particular section of the roof.
- .3 Use 0.80 mm thick x 150 mm long anchor clips on fascia faces, and screws or annular ringed nails on the opposite face.
- .4 Use exposed fastenings in approved locations. Install anchors using annular ringed nails.
- .5 Fasten flashings of 1.2 m length and shorter, through the extended "S" locks. Fasten flashings over 1.2 m length, through the extended "s" locks, and at mid-length with a 150 mm long, 0.80 mm thick galvanized steel clip.
- .6 Fasten flashings at maximum 600 mm O.C.
- .7 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .8 Lock end joints and caulk with sealant.

**END OF SECTION**

**Part 1            General**

**REFERENCES**

- .1    The Aluminum Association Inc. (AA)
  - .1        Aluminum Sheet Metal Work in Building Construction.
  - .2        AA DAF45, Designation System for Aluminum Finishes.
- .2    American Society for Testing and Materials (ASTM International)
  - .1        ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2        ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .3        ASTM D523, Standard Test Method for Specular Gloss.
  - .4        ASTM D822, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3    Canadian General Standards Board (CGBS)
  - .1        CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
- .4    Canadian Standards Association (CSA International)
  - .1        CSA B111, Wire Nails, Spikes and Staples.
- .5    Canadian Roofing Contractors Association (CRCA)
  - .1        Roofing Specifications Manual.

**1.2                SUBMITTALS**

- .1    Submit duplicate 50 x 50 mm samples of each type of sheet metal material, colour and finish.
- .2    Clearly indicate bending, folding, jointing, fastening installation details.

**1.3                DELIVERY AND STORAGE**

- .1    Store products off ground and under cover in a dry, well ventilated enclosure.
- .2    Stack pre-formed material in manner to prevent twisting, bending and rubbing.
- .3    Provide protection for galvanized and pre-coated surfaces.
- .4    Prevent contact of dissimilar metals during storage. Protect from acids, flux, and other corrosive materials and elements.

**Part 2            Products**

**2.1                MATERIALS**

- .1    Rainwater leaders, splash pans, hoppers, downspouts and scuppers: 0.64 mm thick sheet prefinished aluminum, bent to profile as indicated on drawings.

- .1 Colour as selected by Contract Administrator from manufacturer's standard range.
- .2 Trough Supports: continuous aluminum with a perforated aluminum cover that covers the complete trough to prevent debris from getting stuck in the trough and downpipe.
- .3 Downspout: 100 mm x 150 mm profile unless otherwise noted, open face type, single piece length.
- .4 Downspout straps: 0.72 mm thick aluminum.
- .5 Sealant: As per Section 07 92 00 – Joint Sealing.
- .6 Elbows and tees: Aluminum same as trough.
- .7 Provide goosenecks, hoppers, sloped outlets, strainer baskets and necessary fastenings.
- .8 Provide rain water leader to provide transition to downspout as required.

## **2.2 FABRICATION**

- .1 Fabricate sheet aluminum work in accordance with Aluminum Association Aluminum Sheet Metal Work in Building Construction.
- .2 Fabricate eavestrough in continuous length up to a maximum length of 12 metres.
- .3 Form eavestrough to profiles as indicated on drawings.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install sheet metal work to CRCA Specifications.
- .2 Install eaves troughs and secure to building at 750 mm on centre with eaves trough spikes through spacer ferrules. Slope eaves troughs to downpipes as indicated. Seal joints watertight.
- .3 Install trough supports/debris catchers to provide a continuous slope to drain all water from the trough.
- .4 Cut opening in the trough to receive the downpipes.
- .5 Install the trough and snap in to the supports (no exposed screws or nails permitted). Install elbows and tees as required. Provide for expansion joints to prevent warping where required.
- .6 Install aluminum downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1,200 mm oc designed to match the pipe profile and fasten to building with aluminum or stainless steel screws, minimum 2 straps per downspout.
- .7 Install splash pans at end of down pipes spilling out on roof. Seal joint between splash pan and roofing with plastic cement
- .8 Fasten downspouts to steel rain water leaders (lower part) where applicable.

- .9 When work is completed, provide a water test to ensure there are no leaks and that all the water runs from the trough.

**3.2 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Leave works areas clean, free from grease, finger marks and stains.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA B272-93 - Prefabricated Self-Sealing Roof Vent Flashings
- .2 CRCA (Canadian Roofing Contractors Association)
- .3 NRCA (National Roofing Contractors Association)
- .4 SPRI (Single Ply Roofing Institute)
- .5 CUFCA (Canadian Urethane Foam Contractor's Association) and CGSB-51-GP 46MP Manual for "Installers of Spray Polyurethane Foam Thermal Insulation" and ASTM C1029-90 "Spray Applied Rigid Cellular Polyurethane Thermal Insulation"

**1.2 SUBMITTALS**

- .1 Manufacturer's descriptive literature for each product, including section or other type details.
- .2 Manufacturer's written installation instructions.
- .3 Shop drawings and samples, when required, in accordance with Section 01 33 00 – Submittal Procedures.

**1.3 QUALITY ASSURANCE**

- .1 Roof accessories manufacturer to have minimum 5 years documented experience in the design and fabrication of roofing specialties and accessories.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

**1.5 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.



**Part 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 B7).
  - .1 20 year warranty against leaks, condensation and defects in materials and/or manufacture, as applicable;
  - .2 Compliance with CSA B272-93 (Prefabricated Self-Sealing Roof Vent Flashings)
  - .3 Air barrier design using EPDM seals only;
  - .4 Maintenance free design;
  - .5 Materials and sizes options, and thickness;
  - .6 Injection molded urethane insulation to CGSB-51-GP 46MP and ASTM C1029-90, as applicable;
  - .7 Treated deck flange, as applicable;
  - .8 Written installation instructions.

**2.2 MANUFACTURED UNITS**

- .1 Vent Stack Flashing:
  - .1 Thaler SJ-24, 12" (305 mm) high Removable Cap STACK JACK Flashing (Insulated):
    - .1 Mill finish aluminum
    - .2 Diameter sizes to suit, see Mechanical. Confirm with Contract Administrator prior to ordering.
    - .3 To CSA B272-93
    - .4 With removable cap, pre-molded urethane insulation liner, and EPDM Base Seal;
    - .5 Bituminous painted deck flange
    - .6 SS vandal proof cap.
- .2 Conduit Flashing:
  - .1 Thaler MEF Series (height to suit) Liquid Tight Flexible Conduit Flashing:
    - .1 Mill finish aluminum
    - .2 Diameter sizes to suit, see Mechanical. Confirm with Contract Administrator prior to ordering.
    - .3 To CSA B272-93
    - .4 With EPDM end cap seal and base seals, EPDM seals with hole to suit conduit diameter
    - .5 Bituminous painted deck flange

**2.3 SUBSTITUTIONS**

- .1 In accordance with B7.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Report to the Contractor in writing, defects of Work prepared by other trades and other unsatisfactory Site conditions.

- .2 Verify Site dimensions.
- .3 Commencement of Work will imply acceptance of prepared Work.

**3.2 INSTALLATION**

- .1 Install flashing 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 Modified Bitumen 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.

**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.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

**1.2 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 method of installation.
  - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
  - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

**1.3 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company specializing in fire stopping installations with 5 years documented experience approved by manufacturer.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section 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.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

- .2 Storage and Protection:
  - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming 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-S115.
  - .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN-S115 and not to exceed opening sizes for which they are intended.
  - .2 Firestop system rating: as indicated on drawings.
- .3 Service penetration assemblies: certified and tested by ULC or cUL in accordance with CAN-S115.
- .4 Service penetration firestop components: certified and tested by ULC or cUL in accordance with CAN-S115.
- .5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .6 Non-curing, re-penetrable intumescent sealants, caulking or putty material for use with flexible cables or cable bundles.
- .7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal. Consult with Contract Administrator and damper manufacturer prior to installation ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
- .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.

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

**3.4 SEQUENCES OF OPERATION**

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

**3.5 FIELD QUALITY CONTROL**

- .1 Inspections: notify Contract Administrator when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

**3.6 CLEANING**

- .1 Proceed in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

### **3.7 SCHEDULE**

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

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        American Society for Testing and Materials International, (ASTM)
  - .1        ASTM C919, Standard Practice for Use of Sealants in Acoustical Applications.
- .2        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3        Department of Justice Canada (Jus)
  - .1        Canadian Environmental Protection Act (CEPA).
- .4        Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .5        Transport Canada (TC)
  - .1        Transportation of Dangerous Goods Act (TDGA).

**1.2                SUBMITTALS**

- .1        Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Manufacturer's product to describe.
  - .1        Caulking compound.
  - .2        Primers.
  - .3        Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3        Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4        Submit duplicate samples of each type of material and colour.
- .5        Cured samples of exposed sealants for each color where required to match adjacent material.
- .6        Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
  - .1        Instructions to include installation instructions for each product used.

**1.3                DELIVERY, STORAGE, AND HANDLING**

- .1        Deliver, handle, store and protect materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2        Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

**1.4                PROJECT 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 Ventilate area of work as directed by Contract Administrator by use of approved portable supply and exhaust fans.

## **1.6 QUALITY ASSURANCE**

- .1 Perform the work by experienced and skilled mechanics thoroughly trained and competent in the use of caulking and sealing equipment and the specified materials with at least five years experience.
- .2 Arrange with the caulking and sealant manufacturers for a visit at the job site by one of their technical representatives before beginning the caulking and sealing installation to discuss with the Contractor and the Contract Administrator the procedures to be adopted, to analyse site conditions and inspect the surfaces and joints to be sealed, in order that type of sealant recommendations may be made for typical joint configuration.
- .3 Discuss the following items and provide a written report indicating:
  - .1 Sealants and caulking materials selected for use from those specified;
  - .2 Surface preparation requirements;
  - .3 Priming and application procedures;
  - .4 Verification that sealants and caulking are suitable for purposes intended and joint design;
  - .5 Sealants and caulking are compatible with other materials and products with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumens, block, concrete, metals and metal finishes.
  - .6 Verification that sealant and caulking are suitable for temperature and humidity conditions at time of application and will not stain adjacent surfaces;
  - .7 Recommended sealant for each type of joint configuration;



- .8 Joint design;
- .9 Anticipated frequency and extent of joint movement.
- .10 Number of beads to be used in the sealing operation;
- .11 Suitability of durometer hardness and other properties of material to be used.
- .12 Weather conditions under which work will be done.

## 1.7 SEALANT MATERIALS

- .1 Sealants and Caulking compounds must:
  - .1 Meet or exceed all applicable governmental and industrial safety and performance standards; and
  - .2 Be manufactured and transported in such a manner that all steps to the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, by laws and regulations including, for facilities located in Canada, the Fisheries Act and the Canadian Environmental Protection Act (CEPA).
- .2 Sealant 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.
- .3 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.
- .4 Sealant and caulking compounds must be accompanied by detailed instructions for proper application so as to minimize health concerns and maximize performance, and information describing proper disposal methods.
- .5 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .6 When low toxicity caulks are not possible, confine usage to areas which off-gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.
- .7 Where sealants are qualified with primers use only these primers.
- .8 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only these primers.

## 1.8 SEALANT MATERIAL DESIGNATIONS

- .1 Urethanes One Part.
  - .1 Non-Sag to CAN/CGSB-19.13, Type 2.
- .2 Silicones One Part.
  - .1 To CAN/CGSB-19.13, mildew resistant.

- .3 Acoustical Sealant.
  - .1 To ASTM C919.
- .4 Preformed Compressible and Non-Compressible back-up materials.
  - .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
    - .1 Extruded closed cell foam backer rod.
    - .2 Size: oversize 30 to 50 %.
  - .2 Neoprene or Butyl Rubber.
    - .1 Round solid rod, Shore A hardness 70.
  - .3 High Density Foam.
    - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
  - .4 Bond Breaker Tape.
    - .1 Polyethylene bond breaker tape which will not bond to sealant.

#### **1.9 SEALANT SELECTION**

- .1 Perimeters of exterior openings where frames meet exterior facade of building, Sealant type CAN/CGSB- 19.13.
- .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Sealant type CAN/CGSB – 19.13.
- .3 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: CAN/CGSB – 19.13.
- .4 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: CAN/CGSB – 19.13.
- .5 Control and expansion joints on the interior of exterior surfaces of unit masonry walls. Sealant Type CAN/CGSB -19.13.
- .6 Interior control and expansion joints in floor surfaces: Sealant type CAN/CGSB -19.13.
- .7 Perimeters of interior frames, as detailed and itemized: Sealant type CAN/CGSB -19.13.
- .8 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type CAN/CGSB -19.13.
- .9 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities, counters, plastic laminate and adjacent wall finish, etc.): Sealant type CAN/CGSB – 19.13, mildew resistant.
- .10 Exposed interior control joints in drywall: Sealant type: CAN/CGSB -19.13.
- .11 Acoustical Sealant ASTM C919.

#### **1.10 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.

**Part 2 Execution**

**2.1 PROTECTION**

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

**2.2 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.

**2.3 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.

**2.4 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.

**2.5 MIXING**

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

**2.6 APPLICATION**

- .1 Sealant.
  - .1 Apply sealant in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.

- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing.
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.
- .3 Cleanup.
  - .1 Clean adjacent surfaces immediately and leave Work neat and clean.
  - .2 Remove excess and droppings, using recommended cleaners as work progresses.
  - .3 Remove masking tape after initial set of sealant.
  - .4 Remove masking tape after initial set of sealant.

**END OF SECTION**