

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

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

1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

2. PRODUCTS

2.1. BOARD INSULATION –FOUNDATION, GRADE BEAM

- .1 Concrete faced extruded polystyrene (XPS): to CAN/ULC-S701.
- .2 Manufacturer: Tech-Crete CFI panels
 - .1 Type: 4. Rigid closed cell type w/high density skin.
 - .2 Compressive strength: min 30.0 psi.
 - .3 Thermal Resistance: R5.0 per inch.
 - .4 Water Absorption: 0.3 % by volume maximum.
 - .5 Thickness: as indicated.
 - .6 Size: 24" x 48".
 - .7 Edges: t&g on 48", square on 24".
 - .8 Flame/Smoke Properties: in accordance with CAN/ULC-S102.

2.2. BOARD INSULATION –ROOF

Roof Types R1, applied to top side of roof deck

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

Roof Types R1, applied to top of sloped insulation

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

2.3. ADHESIVE

- .1 Type indicated by insulation manufacturer for application.

2.4. ACCESSORIES

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

3. EXECUTION

3.1. MANUFACTURER'S INSTRUCTIONS

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

3.2. WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Contract Administrator.

3.3. EXAMINATION

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

3.4. PERIMETER FOUNDATION INSULATION

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

3.5. ROOF INSTALLATION

- .1 Confirm with roofing manufacturer's instructions.

3.6. FIELD QUALITY CONTROL

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

3.7. CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

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

1.3. ACTION AND INFORMATIONAL SUBMITTALS

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

1.4. COORDINATION

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

1.5. QUALITY ASSURANCE

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

1.6. SITE CONDITIONS

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

2. PRODUCTS

2.1. MATERIALS

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

3. EXECUTION

3.1. MANUFACTURER'S INSTRUCTIONS

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

3.2. PREPARATION

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

3.3. APPLICATION

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

3.4. CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Steel faced, polyurethane (polyisocyanurate) metal wall panels.
- B. Accessories including fasteners and perimeter trim.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)
 - 1. AAMA 501.1: Standard Test Method for Metal Curtain Walls for water penetration using Dynamic Pressure
 - 2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
- B. American Society of Civil Engineers (ASCE)
 - 1. ASCE 7: Minimum Design Loads for Building and Other Structures
- C. ASTM International
 - 1. ASTM A480: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
 - 2. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 3. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
 - 4. ASTM A792: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - 5. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process
 - 6. ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus
 - 7. ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - 8. ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board
 - 9. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
 - 10. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 11. ASTM C920: Standard Specification for Elastomeric Joint Sealants
 - 12. ASTM D224: Standard Specification for Smooth-Surfaced Asphalt Roll
 - 13. ASTM D522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
 - 14. ASTM D523: Standard Test Method for Specular Gloss
 - 15. ASTM D714: Standard Test Method for Evaluating Degree of Blistering of Paints
 - 16. ASTM D968: Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
 - 17. ASTM D1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - 18. ASTM D1621: Standard Test Method of Compressive Properties of Rigid Cellular Plastics
 - 19. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
 - 20. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties

of Rigid Cellular Plastics

21. ASTM D1654: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
22. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
23. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
24. ASTM D2244: Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
25. ASTM D2247: Standard Practice for Testing Water Resistance of Coating in 100 percent Relative Humidity
26. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
27. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on Surface of Interior Coating in an Environmental Chamber.
28. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape Test
29. ASTM D3363: Standard Test Method for Film Hardness by Pencil Test
30. ASTM D4145: Standard Test Method for Coating Flexibility of Prepainted Sheet
31. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
32. ASTM D5894: Standard Practice for Cyclic salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)
33. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics
34. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
35. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
36. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
37. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
38. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
39. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
40. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
41. ASTM G154: Standard Practice of Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

D. FM Global (FM)

1. Approval Standard 4880; Class 1 Fire Rating of Insulated Wall of Wall and Rood/Ceiling Panels, Interior Finish Materials of Coatings, and Exterior Wall Systems.
2. Approval Standard 4881; Class 1 Exterior Wall Systems

E. International Building Code (IBC): current edition

F. Nation Fire Protection Agency (NFPA)

1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
2. NFPA 268: Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
3. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing wall Assemblies Containing Combustible Components.

G. UL Canada (ULC) Approvals:

1. CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials
2. CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building materials and Assemblies
3. CAN/ULC-S127: Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials
4. CAN/ULC-S134: Fire Test of Exterior Wall Assemblies

H. International Organization for Standardization (ISO)

1. ISO14025: Environmental Labels and Declarations

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting: Conduct a pre-installation meeting at the job Site attended by The City, Contract Administrator, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.4 SUBMITTALS

- A. Refer to Section [01 33 00 Submittal Procedures]
- B. Product Data: Submit manufacturer current technical literature for each type of product
- C. Shop Drawings: Submit detailed drawings and panel analysis showing:
1. Profile
 2. Gauge of both exterior and interior sheet
 3. Location, layout and dimensions of panels
 4. Location and type of fasteners
 5. Shape and method of attachment of all trim
 6. Locations and type of sealants
 7. Installation sequence
 8. Coordination Drawings: provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support
 9. Other details as may be required for a weathertight installation
- D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding $1/180$. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout

E. Samples: Provide [Provide panel width by 8 inches long minimum]

F. Miscellaneous Certificates:

1. Submit documentation that products have been certified in accordance with ISO 14025

G. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years' experience in the production of insulated wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance, with ISO 14025, for Insulated Metal Panels.

B. Installer Qualifications: Authorized by the manufacturer and the Work shall be supervised by a person having a mini of five (5) years' experience installing insulated wall panels on similar type and size projects.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact

B. Store wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or Workmanship within specified warranty period. The items covered by the warranty include structural performance including bond integrity, deflection, and buckling.

1. Warranty Period: Two (2) years from date of Substantial Completion, 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance

with ASTM D4214, Method A, and/or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.

1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Kingspan Insulated Panels Ltd. 12557 Coleraine Drive, Caledon, ON L7E 3B5 (866-442-3594); 5202-272nd Street, Langley, B.C. V4W 1S3 (866-442-3594)(www.kingspanpanels.ca);
- B. Kingspan Insulated Panels, Inc. 726 Summerhill Drive, Deland, FL 32724 (888-882-5862); 2000 Morgan Road, Modesto, CA 95358 (800-377-5110)(www.kingspanpanels.us)
- C. Basis of Design: Kingspan KS Series
- D. Substitution shall be in accordance with B7

2.2 EXTERIOR WALL PANELS

- A. Performance Criteria:
 1. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 and E330. Deflection criteria shall be [L/180]
 2. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads (positive and negative loads), when applied for two million alternate cycles of L/180 deflection.
 3. Freeze / Heat Cycling Test: Panels shall exhibit no delamination, surface blisters, permanent bowing or deformation when subjected to cyclic temperature extremes of minus 20 deg. F temperatures for twenty one, eight-hour cycles.
 4. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E331.
 5. Dynamic Water Penetration: There shall be no uncontrolled water penetration through the panel assembly at a pressure difference of 12 psf, when tested in accordance with AAMA 501.1.
 6. Air Infiltration: Air infiltration through the panel shall not exceed 0.001 cfm/sf at 20 psf air pressure differential when tested in accordance with ASTM E283.
 7. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion when subjected to plus 140 deg. F temperature and 100 percent relative humidity for a total of 1200 hours (50 days)
 8. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of the foam core from the metal skins after being subjected in an autoclave to a pressure of 2psig (13.8kPa) at a temperature of plus 218 deg. F (plus 103 deg. C) for a period of 2 ½ hours.
 9. Panel Fire Tests:

- i. Fire Endurance Test – 10 minutes: Panels remained in place without joint stitch fastening per CAN/ULC-S101.
- ii. Fire Endurance Test – 15 minutes: Panels remained in place with joint stitch fastening per CAN/ULC-S101.

10. Flame Spread and Smoke Developed Tests on exposed Insulating Core:

- i. Flame Spread: Less than 25.
- ii. Smoke Developed: Less than 250.
- iii. Tests performed in accordance with CAN/ULC-S102 and ASTM E84

11. Fire Test Response Characteristics: steel-faced panels with polyisocyanurate (ISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.

- i. FM 4880: Class I rated per FM Global, panels are approved for use without a thermal barrier and do not create a requirement for automatic sprinkler protection.
- ii. NFPA 259 Potential Heat Content; established for foam core.
- iii. NFPA 268 Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source; successfully passed acceptance criteria.
- iv. NFPA 285 Intermediate Scale Multi-story Fire Evaluation; successfully passed acceptance criteria.
- v. UL 263 Fire Resistive Rating; classified as a component of a fire-rate wall assembly for 1-hour and 2-hour rating Design No. U053 (rated assemblies include appropriate layers of fire-rated Type X Gypsum board).
- vi. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
- vii. S101, S102, S127, S134 UL Canada fire test standards; successfully passed

12. Windborn Debris rating for Wall Panel:

- i. Meet requirements for high velocity hurricane zone with large missile impact when tested in accordance with GM Standard 4881.

13. Insulating Core: Polyisocyanurate (ISO) core, ASTM C591 Type IV, CFC, and HCFC free, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:

- i. Core is 90 percent closed cell when tested in accordance with ASTM D6226
- ii. Panel shall provide a nominal R-value of 7.5 per inch thickness when tested in accordance with ASTM C518 at mean temperature of 75 deg. F.
- iii. Foam has a density of 2.2 to 2.8 pounds per cubic foot when tested in accordance with ASTM D1622
- iv. Compressive Stress:
 1. Parallel to Rise: 42 psi
 2. Perpendicular to Rise: 24 psi
 3. Tested in accordance to ASTM D1621
- v. Shear Stress: 17.5 psi when tested in accordance with ASTM C273

- vi. Tensile Stress: 25 psi when tested in accordance with ASTM D1623
- vii. Oven Aging at 200 degrees F:

- 1. 1 day: plus 1 percent volume change
- 2. 7 days: plus 3 percent volume change
- 3. Tested according to ASTM D2126

- viii. Low temperature Aging at minus 20 degrees F:

- 1. 1 day: 0 percent volume change
- 2. 7 days: 0 percent volume change
- 3. Tested according to ASTM D2126

B. Paint Finish Characteristics:

- 1. Gloss: 15 ± 5 measured at 60 degree angle tested in accordance with ASTM D523
- 2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363
- 3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
- 4. Flexibility, Mandrel: No cracking when bent 180° around a 1/8 mandrel as tested in accordance with ASTM D522
- 5. Adhesion: No adhesion loss tested in accordance with ASTM D3359
- 6. Reverse Impact: No cracking or adhesion loss when impacted 3000 by inches of metal thickness (lb-in), tested in accordance with ASTM D2794
- 7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32 inch diameter of metal substrate when tested in accordance with ASTM D968.
- 8. Graffiti Resistance: Minimal effect.
- 9. Acid Pollutant Resistance: No effect when subjected to 30 percent sulfuric acid for 18 hours, or 10 percent muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
- 10. Salt Fog Resistance: Passes 100 hours, when tested in accordance with ASTM B117 (5 percent salt fog at 95 deg. F)
- 11. Cyclic Salt Fog and UV exposure: Passes 2016 hours when tested in accordance with ASTM D5894
- 12. Humidity Resistance: Passes 11500 hours at 100 percent relative humidity and 95 deg. F, with a test rating of 10 when tested in accordance with ASTM D2247, and D714.
- 13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154
- 14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
- 15. Color Tolerances: Maximum of 5 ΔE Hunter unites on panels when tested in accordance with ASTM D2244.

C. Exterior Aggregate Finish Characteristics:

- 1. Moisture Resistance: 14 days exposure with no deleterious effects when tested in accordance with ASTM D2247
- 2. Salt Spray: 100 hours, deleterious effects when tested in accordance with ASTM B117.

3. Abrasion Resistance: 500 liters of sand, no deleterious effects when tested in accordance with ASTM D968
4. Freeze/Thaw (60 cycles): No checking, cracking or splitting
5. Mildew Resistance: No growth of mildew per ASTM D3273
6. Flame Spread: less than 25, Class 1 rating when tested in accordance with ASTM E84

D. Panel Assembly:

1. Panel thickness: 4 inches thick
2. Panel width: 42 inches
3. Panel Lengths: As indicated on Drawings
4. Panel Attachment: Shall consist of fasteners and stainless steel attachment clip completely concealed within the panel side joint.
5. Horizontal Panel Joint Reveals: 3/8 inch
6. Vertical Joint Treatments (for horizontal panels):
 - i. Panel trimless ends with black EPDM gasket insert
 - ii. Surface mounted aluminum extrusion with reveal and black EPDM gasket insert
 - iii. Surface mounted aluminum extrusion with reveal and Flush aluminum insert
 - iv. Surface mounted top hat metal flashing
7. Vertical Panel Joint Reveals: 1/8 inch.
8. Exterior Face of Panel:
 - i. Material:
 1. Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792
 2. Gauge: 24 gauge
 - ii. Profile: Shadowline
 - iii. Texture: Non-directional stucco embossed
 - iv. Exterior Paint Finish Color:
 1. Solid Fluoropon PVDF Colours, Kyndr 500/Hylar 5000
 2. Finish System:
 - a. Gate Gory 1 Sandstone
9. Interior Face of Panel
 - i. Material:
 1. Steel coil material shall be in accordance with ASTM A755:AZZ50 Galvalume®/Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792
 - ii. Profile: Shadowline

1. Profile description: Linear striations nominal 0.0625 inch deep by $\frac{3}{4}$ inches wide at 3 inches on center.

- iii. Texture: Non-directional stucco embossed
- iv. Gauge: 26
- v. Interior Finish: modified polyester, dry film thickness of 1.0 mil including primer

1. Color: USDA Imperial White

2.3 ACCESSORIES

A. Fasteners:

1. Self drilling fasteners shall be cadmium plated steel with neoprene washer, as recommended by manufacturer
2. Material: Hex-head type with steel and neoprene washer and gauge stainless steel clip supplied by the manufacturer
3. Size: As recommended by manufacturer

B. Perimeter Trim:

1. Fabricated Parapet, Cap and trim and metal flashing: Shall be same gauge, material and coating color as exterior face of insulated metal wall panel. As in Drawings
2. Extruded perimeter trim: Shall be extruded aluminum 6063-T5 alloy with spray applied PVF coating in same color as exterior face of insulated metal wall panel

C. Sealants: Butyl, non-skinning/curing type as recommended by manufacturer

D. Butyl Tape: As recommended by manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Provide fields measurements to manufacturer as required to achieve proper fit of the preformed wall panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.
- B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:
 1. Plus or minus $\frac{1}{8}$ inch in 5 feet in any direction along plane of framing
 2. Plus or minus $\frac{1}{4}$ inch cumulative in 20 feet in any direction along plane of framing.
 3. Plus or minus $\frac{1}{2}$ inch from framing plane on any elevation
 4. Plumb or level within $\frac{1}{8}$ inch at all changes of transverse for pre-formed corner panel applications
 5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support

shall be as recommended by manufacturer

- C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 PANEL INSTALLATION

- A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.
- B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings
- C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.
- D. Butyl Weather Barrier Sealant:
 - 1. Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels.
 - 2. Use non-skinning butyl tube sealant only for tight metal-to-metal contact
 - 3. Do not use on non-skinning butyl tube sealant to bridge gaps.
- E. Place panel fasteners through pre-punched holes in attachment clips, concealed within the joint of the panel. Secure units to the structural supports. Space clips as recommended by manufacturer or otherwise indicated on the approved shop drawings.

3.3 TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings
- B. Field drill weep holes where appropriate in horizontal trim; minimum ¼ inch diameter at 24 inches on center
- C. Place a continuous strip of butyl tube sealant between the inside back face of closure trims and interior panel faces for proper vapor seal

3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS

- A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations
- B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion
- C. Direct contact between butyl and silicone sealants shall not be permitted

3.5 TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings

- B. Field drill weep holes where appropriate in horizontal trim where indicated on shop drawings
- C. Place a continuous strip of butyl tape or butyl sealant on closure trims for the length of the panel to be covered as indicated on shop drawings

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall engage an independent testing and inspection agency acceptable to the Contract Administrator to perform field tests and inspections and to prepare reports of findings.
- B. Field Water Test: After completing portion of metal wall panel assembly including accessories and trim, test a 2-bay area selected by the Contract Administrator for water penetration in accordance with AAMA 501.2

3.7 CLEANING AND PROTECTION

- A. Remove protective film immediately after installation
- B. Touch-up, repair, or replace metal panels and trim that have been damaged
- C. After metal wall panel installation, clear weep holes and drainage channels of obstruction, dirt, and sealant

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

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

1.3. PRODUCT DATA

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

- .4 Limitations.
- .3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.

1.4. DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to the job Site in undamaged and original packaging indicating the name of the manufacturer and product. Provide and maintain dry, off-ground weatherproof storage.
- .2 Cold applied elastomeric membrane should be stored in closed containers outdoors.
- .3 Store membrane at temperature of 5 degrees C (40 degrees F) and above to facilitate handling
- .4 Membrane contain petroleum solvents and are flammable. Do not use near open flame
- .5 Store role materials horizontally in original packaging.
- .6 Store adhesives and primers at temperatures of 5 degrees C and above to facilitate handling

1.5. ENVIRONMENT

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

1.6. QUALITY ASSURANCE

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

2. PRODUCTS

2.1. MEMBRANES

- .1 Primary sheet air/vapour barrier shall be Henry-Bakor Blueskin TG, SBS modified bitumen, reinforced thermofusible membrane having the following physical properties:
 - .1 Thickness: 2.5mm (100 mils) min.
 - .2 Air Leakage: 0.000 L/s.m² @ 75 Pa

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

2.2. PRIMERS

- .1 Sheet membrane primer shall be 930-18 Poly-Tac manufactured by Henry-Bakor, a polymer modified primer having the following physical properties:
 - .1 Colour: Blue,
 - .2 Weight: 0.9 kg/l,
 - .3 Solids by weight: 30%,
 - .4 Application temp: no limit.

- .2 Primer for self-adhering membranes at temperatures above -12°C shall be Blueskin LVC manufactured by Henry-Bakor, a synthetic rubber based adhesive type, quick setting, having the following physical properties:
 - .1 Colour: Blue,
 - .2 VOC: <240g/L
 - .3 Solids by weight: 40%,
 - .4 Drying time (initial set): 30 minutes.

- .3 Primer for self-adhering membranes at temperatures above -4°C shall be Aquatec Primer manufactured by Henry-Bakor, a polymer emulsion based adhesive type, quick setting, having the following physical properties:
 - .1 Colour: Aqua,
 - .2 Weight: 1.0 kg/l,
 - .3 Solids by weight: 35%,
 - .4 Water based, no solvent solutions,
 - .5 Drying time (initial set): 30 minutes at 50% relative humidity and 20°C.

2.3. MASTICS AND TERMINATION SEALANT

- .1 Liquid air seal mastic and insulation adhesive shall be Air-Bloc 21 or 230-21 Insulation Adhesive manufactured by Henry - Bakor, a synthetic, trowel applied, rubber based adhesive type, having the following characteristics:
 - .1 Compatibility: With air/vapour barrier membrane, substrate and insulation.
 - .2 Air leakage: 0.013 L/s.m² @ 100 Pa.,
 - .3 Water vapour permeance: 1.7 ng/Pa.m².s. (0.03 perms),
 - .4 Long term flexibility: CGSB 71-GP-24M,
 - .5 Chemical resistance: Alkalis and salt.

- .2 Termination Sealant shall be HE925 BES Sealant manufactured by Henry - Bakor, a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:
 - .1 Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
 - .2 Complies with Fed. Spec. TT-S-00230C, Type II, Class A,
 - .3 Complies with ASTM C 920, Type S, Grade NS, Class 25,
 - .4 Elongation: 450 – 550%,
 - .5 Remains flexible with aging,
 - .6 Seals construction joints up to 1 inch wide.

- .3 Termination Sealant shall be POLYBITUME® 570-05 Polymer Modified Sealing Compound manufactured by Henry - Bakor, a polymer modified sealing compound having the following characteristics:
 - .1 Compatible with sheet waterproofing membrane and substrate.
 - .2 Solids by volume: 70%,
 - .3 Vapour permeance: 2.9 ng/Pa.m².s, ASTM E96,
 - .4 Complies with CGSB 37.29,
 - .5 Remains flexible with ageing,
 - .6 Adheres to wet surfaces,
 - .7 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions.

3. EXECUTION

3.1. EXAMINATION

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

3.2. PREPARATION

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

3.3. PRIMER

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

3.4. AIR VAPOUR BARRIER MEMBRANE

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

3.5. THROUGH-WALL FLASHING & DAMPPROOF COURSE

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

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

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

3.6. SELF-ADHERED TRANSITION MEMBRANE

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

3.7. INSPECTION

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

3.8. INSTALLATION OF INSULATION

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

3.9. PROTECTION OF FINISHED WORK

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

3.10. FIELD QUALITY CONTROL

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

3.11. CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

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

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

1.3. PERFORMANCE REQUIREMENTS

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

1.4. SUBMITTALS

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

1.5. QUALITY ASSURANCE

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

1.6. STORAGE AND HANDLING

- .1 All materials will be delivered and stored in conformance with the requirements described in the 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

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

1.7. PROTECTION

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

1.8. ENVIRONMENTAL REQUIREMENTS

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

1.9. WARRANTY

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

2. PRODUCTS

2.1. DECK COVERING

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

2.2. VAPOUR RETARDER

- .1 Self-adhesive Air/Vapour Barrier: membranes composed of bitumen modified with thermoplastic polymers and high-density polyethylene film. The width of the membrane to be 1.14 meters (45 inches). The self-adhesive under face is covered with a silicone release sheet. Water vapour permeability: 0.06 ng/Pa·s·m² (0.0011 Perm).]
- .2 Acceptable material: SOPRAVAP'R by SOPREMA (or approved equal in accordance with B7).
- .3 Vapour retarder continuity strip: waterproofing membrane with non-woven polyester reinforcement, fiberglass and elastomeric bitumen. The upper surface is sanded and the under face is self-adhesive.

2.3. INSULATION

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

2.4. MEMBRANE SYSTEM

- .1 Acceptable system: COLVENT system (semi-independent self-adhesive base sheet) by SOPREMA (or approved equal in accordance with B7).
- .2 Reinforced elastomeric bitumen waterproofing system with a semi-independent, self-adhesive base sheet and a heat-welded cap sheet. The top surface of the base sheet is covered with a thermo-fusible plastic film and must have three distinctive blue lines to facilitate roll alignment. The bottom surface of the cap sheet is covered with a thermofusible plastic film and the top surface protected by coloured granules.
- .3 Components
 - .1 Reinforcement: combination of glass and polyester
 - .2 Elastomeric bitumen: blend of selected bitumen and SBS polymer
 - .3 System properties: Traffic only

	MD	XD
.1 Strain energy (kN/m)	9.4	9.2
.2 Breaking strength (N/5 cm)	19.2	16.3
.3 Ultimate elongation (%)	54	62
.4 Cold bending at -30°C	No cracking	
.5 Softening point	≥ 110°C	
.6 Static puncture (N)	380	
- .4 Prefabricated membrane, complies with CAN/CGSB 37-GP-56M (9th draft).
- .5 Acceptable materials:
 - .1 Base sheet membrane: COLVENT BASE 810 by SOPREMA
 - .2 Cap sheet: COLVENT TRAFFIC CAP-860 by SOPREMA (grey colour)

2.5. UPSTAND SYSTEM (SELF ADHESIVE SHEET)

- .1 Membrane flashing to be two plies of reinforced modified bitumen membrane and the base sheet to be self-adhesive. The top surface of the base sheet is covered with a thermofusible plastic film and the bottom surface is protected by silicone release paper. Cap sheet top surface is protected with coloured granules and the bottom surface is covered with a thermofusible plastic film. Cap sheet membrane is applied by heatwelding.
- .2 Components
 - .1 Reinforcement: combination of glass and polyester
 - .2 Elastomeric bitumen: blend of selected bitumen and SBS polymer
 - .3 System properties:

	MD	XD
.1 Strain energy (kN/m)	8.4	8.3
.2 Breaking strength (N/5 cm)	18	16
.3 Ultimate elongation (%)	55	56
.4 Tear resistance (N)	120	

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

2.6. ACCESSORIES MEMBRANES

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

2.7. PRIMER

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

2.8. COMPLEMENTRY WATERPROOFING PRODUCTS

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

2.9. PREFABRICATED FLASHINGS

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

2.10. SEALERS

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

2.11. CARPENTRY

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

2.12. SUBSTITUTIONS

- .1 Refer to Section 01 25 00 Substitution Procedures

3. EXECUTION

3.1. WORKMANSHIP

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

providing connection point for continuity of air barrier.

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

3.2. EXAMINATION OF ROOF DECKS

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

3.3. PROTECTION

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

3.4. APPLICATION PRIMER

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

3.5. INSTALLATION OF DECK COVERING

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

3.6. INSTALLATION OF VAPOUR RETARDER

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

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

3.7. INSULATION INSTALLATION

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

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

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

3.9. INSTALLATION OF REINFORCEMENT GUSSETS

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

3.10. BASE SHEET FLASHING INSTALLATION (SELF ADHERED)

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

3.11. ROOF CAP SHEET INSTALLATION (TORCH APPLIED MEMBRANE)

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

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

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

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

3.13. WATERPROOFING FOR DRAINS, VARIOUS DETAILS

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

3.14. FIELD QUALITY CONTROL

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

3.15. CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by Work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by Work of this section.

END OF SECTION

1. GENERAL

1.1. SECTION INCLUDES

- .1 Formed metal trim.

1.2. RELATED REQUIREMENTS

- .1 Section 07 42 13 – Metal Wall Panel – Pre-finish Parapet Cap & Flashing
- .2 Section 07 52 00 – Modified Bituminous Membrane Roofing

1.3. REFERENCES

- .1 ASTM International (ASTM)
 - .1 ASTM A 653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B209M-14 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN?CGSB-51.32-M77, Sheathing, Membrane, Breather Type
- .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
 - .1 SMACNA 1120-2012 – Architectural Sheet Metal Manual, 7th Edition

1.4. SUBMITTALS

- .1 Section 01 33 00: Submission procedures
- .2 Shop Drawings:
 - .1 Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
 - .2 Indicate materials and methods used to isolate and protect incompatible materials.
- .3 Samples: Submit duplicate 50 by 50 mm samples of each type of sheet metal material, colour and finish.

1.5. QUALITY ASSURANCE

- .1 Perform Work to SMACNA 1120 standard details and requirements.

1.6. DELIVERY, STORAGE AND PROTECTION

- .1 Section 01 61 00: Transport, handle, store and protect products.
- .2 Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- .3 Prevent contact with materials which may cause discoloration or staining.

1.7. WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 20 – Waste Management and Disposal

2. PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

- .1 General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural moment, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak or loosen, and shall remain watertight and provided finished appearance

2.2. SHEET MATERIALS

- .1 Galvanized Steel: to ASTM A653/A653M, Z275 zinc coating designation; minimum 0.61 core steel thickness
- .2 Sheet Metal for Parapet Cap & Flashing. Supply by IMP Manufacturer, colour to match IMP Panels

2.3. ACCESSORIES

- .1 General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.

- .2 Isolation coating: alkali resistant bituminous paint.
- .3 Plastic cement: to CAN/CGSB 37.5.
- .4 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .5 Sealants: as specified in Section 07 92 00 – Joint Sealants
- .6 Cleats: of same material, and temper a sheet metal, continuous. Thickness same as sheet metal being secured.
- .7 Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - .1 General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - .1 Exposed Fasteners: Heads matching colour of sheet metal using plastic caps or factory-applied coating.
 - .2 Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - .2 Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - .3 Fasteners for Metallic-Coated Steel Sheet, and Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel
- .8 Washers: of same material as sheet metal, 1mm thick with rubber packings.
- .9 Touch-up paint: as recommended by prefinished material manufacturer.

2.4. FABRICATION

- .1 General: Custom fabricate sheet metal flashing and trim to comply with recommendations SMACNA's Architectural Sheet Metal Manual that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - .1 Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - .2 Obtain field measurements for accurate fit before shop fabrication.
 - .3 Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - .4 Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- .2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints. Underflash at joints, with closed turned up ends.
- .3 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

3. EXECUTION

3.1. EXAMINATION

- .1 Section 01 70 00: Verify existing conditions before starting Work.
- .2 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, and nailing strips located.
- .3 Verify roofing termination and base flashings are in place, sealed, and secure.

3.2. PREPARATION

- .1 Install starter and edge strips, and cleats before starting installation.

3.3. INSTALLATION

- .1 Install sheet metal Work in accordance with CRCA FL series details, and as detailed.
 - .1 Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - .2 Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - .3 Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - .4 Do not torch cut sheet metal flashing and trim

- .5 Do not use graphite pencils to mark metal surfaces
- .2 Use concealed fastenings except where approved before installation.
- .3 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.
- .4 Lock end joints and caulk with sealant.
- .5 Metal protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA Architectural Sheet Metal Manual.
 - .1 Coat backside of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - .2 Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install course of polyethylene sheet. Secure in place and lap joints 100 mm.
- .6 Insert metal flashing under cap flashing to form weathertight junction.
- .7 Caulk flashing at cap flashing with sealant.
- .8 Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 3 m with no joints allowed within of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 25 mm deep, filled with sealant concealed within joints.
- .9 Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA Architectural Sheet Metal Manual, and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 75-mm centres.
- .10 Coping: Anchor to resist uplift and outward forces according to recommendations in SMACNA Architectural Sheet Metal Manual, and as indicated.
 - .1 Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 400-mm centres.
 - .2 Anchor interior leg of coping with washers and screw fasteners through slotted holes at 600-mm centres.

3.4. CLEANING AND PROTECTION

- .1 Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- .2 Clean and neutralize flux materials.
- .3 Clean off excess sealants.

3.5. SCHEDULES

- .1 Aluminum Flashing and Trim: Form exposed flashing to profiles indicated of prefinished aluminum sheet.
 - .1 At parapets, and within 1200mm of floor or grade: Minimum 3 mm thick, base metal thickness.
 - .2 Other locations: Minimum 0.81 mm thick, base metal thickness.
- .2 Galvanized Flashing and Trim:
 - .1 Concealed Flashing: Form to profiles indicated of minimum 0.61 mm thick galvanized sheet steel.
 - .2 Drop Edge: Fabricate continuous sections from minimum 0.61 mm thick galvanized sheet steel for under copings, and where indicated. Fabricate discontinuous sill, and similar flashings to extend 150 mm beyond each side of wall openings. Form with 50-mm-high, end dams where flashing is discontinuous.

END OF SECTION

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

- .1 Canadian Standards Association
 - .1 CSA B272-93 – Prefabricated Self-Sealing Roof Vent Flashings
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual [1997].
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.
 - .2 CAN/CGSB-93.1-[M85], Sheet Aluminum Alloy, Prefinished, Residential.
- .4 SMACNA – Architectural Sheet Metal Manual.

1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4. QUALIFICATIONS

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

1.5. DELIVERY, STORAGE AND HANDLING

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

1.6. COORDINATION

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

1.7. WARRANTY

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

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURER

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

Mississauga, Ontario, Canada (or approved equal in accordance with B7).

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

2.2. MANUFACTURED UNITS

- .1 Removable Cap STACK JACK Flashing (Insulated)
 - .1 Vent stack flashing:
 - .1 Thaler SJ-27-A, 18" (457 mm) high Removable Cap STACK JACK Flashing (Insulated);
 - .2 .064" (1.6 mm) mill finish 1100-0T alloy aluminum
 - .3 Diameter sizes to suit, see Mechanical. Confirm with Contract Administrator prior to ordering.
 - .4 To CSA B272-93
 - .5 With removable cap, pre-molded urethane insulation liner, and EPDM Base Seal;
 - .6 Bituminous painted deck flange
 - .7 SS Vandal proof cap.

3. EXECUTION

3.1. EXAMINATION

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

3.2. INSTALLATION

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

3.3. FIELD QUALITY CONTROL

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

3.4. ADJUSTING

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

3.5. CLEANING

- .1 Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaners or techniques which could impair performance of the roofing system.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

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

1.2. 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.

1.3. DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on Site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4. SYSTEM DESCRIPTION

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

1.5. REGULATORY REQUIREMENTS

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

1.6. ENVIRONMENTAL REQUIREMENTS

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

1.7. ACTION AND INFORMATIONAL SUBMITTALS

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

1.8. QUALITY ASSURANCE

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

2. PRODUCTS

2.1. MATERIALS

- .1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions confirming to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.
- .2 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
 - .2 Firestop system rating: as indicated on drawings.
- .3 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .4 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe. No silicone based firestop are allowed to be applied on plastic pipes.
- .9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .12 Sealants for vertical joints: non-sagging.

3. EXECUTION

3.1. MANUFACTURER'S INSTRUCTIONS

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

3.2. PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3. INSTALLATION

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

3.4. SEQUENCES OF OPERATION

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

3.5. CLEANING

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

3.6. SCHEDULE

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

- .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .6 Openings and sleeves installed for future use through fire separations.
- .7 Around mechanical and electrical assemblies penetrating fire separations.
- .8 Rigid ducts: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

1. GENERAL

1.1. RELATED REQUIREMENTS

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

1.2. REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 919-[02], Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-[1984], Sealing Compound, One Component, AcrylicBase, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-[M87], Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-[1984], Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.
- .3 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .4 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-[E(2)1993], Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.3. ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00 Submittal Procedures – Shop Drawings, Product Data, and Samples, with the VOC levels highlighted.
- .3 Manufacturer's product to describe.
 - .1 Caulking compound.

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

1.4. SITE CONDITIONS

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

1.5. ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.
- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 Adhesives and sealants must conform to State of California's South Coast Air Quality Management District (SCAQMD) Rule #1168, June 2006 with VOC contents as stipulated.

1.6. QUALITY CONTROL

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

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

1.7. MOCKUPS

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

2. PRODUCTS

2.1. SEALANT MATERIALS

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

2.2. SEALANT MATERIAL DESIGNATIONS

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

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

2.3. SEALANT SELECTION

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

2.4. JOINT CLEANER

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

3. EXECUTION

3.1. GENERAL

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

3.2. PROTECTION

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

3.3. SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter, which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.4. PRIMING

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

3.5. BACKUP MATERIAL

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

3.6. APPLICATION

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

3.7. CLEANING

- .1 Proceed in accordance with Section 01 74 11 -Cleaning.
- .2 Clean adjacent surfaces immediately and leave Work neat and clean.
- .3 Remove excess and droppings, using recommended cleaners as Work progresses.
- .4 Remove masking tape after initial set of sealant.

END OF SECTION