1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
- .2 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .3 CGSB 37-GP-11M-76(R1984), Application of Cutback Asphalt Plastic Cement.
- .4 CGSB 37-GP-15M-76(R1984), Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .5 CAN/CGSB-37.16-M89, Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
- .6 CGSB 37-GP-36M-76, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for bituminous dampproofing application and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.
- .2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.
- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements.

.2 Delivery Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

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

1.5 SITE CONDITIONS

.1 Ambient Conditions: temperature, relative humidity, moisture content.
.1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
.2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
.3 Maintain air temperature and substrate temperature at dampproofing installation area above 5°C for 24 hours before, during and 24 hours after installation.
.4 Do not apply dampproofing in wet weather.

.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.

2 Products

2.1 MATERIALS

.1 Asphalt: to CAN/CGSB-37.16-M.
.1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.

.2 Sealing compound: plastic cutback asphalt cement to CAN/CGSB-37.5-M.

.3 Asphalt primer: to CGSB 37-GP-9Ma.

3 Execution

3.1 EXAMINATION

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

3.2 PREPARATION

.1 Before applying dampproofing:
.1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.3 APPLICATION

.1 Do dampproofing in accordance with CGSB 37-GP-36M.

.2 Do sealing work in accordance with CGSB 37-GP-11M.

.3 Do priming of surface in accordance with CGSB 37-GP-15M.

3.4 SCHEDULE

.1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.2 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 10 01 - General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 10 01 - General Requirements.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by dampproofing application.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 21 16 - Batt insulation.

.2 Section 20 07 00 - Thermal Insulation for Piping.

1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM C612-14, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .2 ASTM C1325-08b, Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

.2 Canadian General Standards Board (CGSB).
- .1 CGSB 71-GP-24M+Amdt-Nov-83, Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.

.3 Underwriters Laboratories of Canada (ULC).
- .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .3 CAN/ULC S702-09, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
- .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
- .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

2 Products

2.1 RIGID INSULATION

.1 Extruded polystyrene (XPS): to CAN/ULC-S701, Type 4; thickness as indicated.

2.2 ACCESSORIES

.1 Protection board: cement board, to ASTM C1325.

.2 Parge coating: of type compatible with protection board and suitable for application; complete with fibreglass reinforcing tape.

.3 Self-tapping concrete screw or other approved fastener, complete with nailing disk, as approved by foundation coating manufacturer.

3 Execution

3.1 WORKMANSHIP

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Fit insulation tight around obstructions and protrusions.

.3 Do not enclose or cover insulation until it has been inspected and approved by Departmental Representative.

3.2 FOUNDATION COATING APPLICATION

.1 Mechanically fasten cement board through insulation boards into foundation using self-tapping concrete screw.

.2 Take care to ensure that insulation is fitted snugly against foundation and without gaps or open seams.

.3 Apply reinforcing tape at joints and screw heads.

.4 Mix and apply parge coating in accordance with manufacturer's instructions.

3.3 RIGID INSULATION INSTALLATION

.1 Install extruded polystyrene insulation at perimeter of foundation. Coat with foundation coating.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 21 13 - Board Insulation.

1.2 REFERENCES

.1 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S702-14, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet.

1.4 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.
.1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.
.2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.
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.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.
.2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

2 Products

2.1 INSULATION

.1 Batt insulation: Mineral fibre, to CAN/ULC S702; unfaced.

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 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Fit insulation closely around objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Do not enclose insulation until it has been reviewed by Departmental Representative.

3.3 CLEANING

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

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 21 13 - Board Insulation.

.2 Section 07 21 16 - Batt Insulation.

.3 Section 07 21 30 - Thermal Barrier for Plastic Insulation.

.4 Section 07 42 13 - Metal Wall Panels: Installation of girts.

.5 Section 07 27 10 - Air/Vapour Retarder: air/vapour retarder membrane, transition membrane and thru-wall flashing.

1.2 REFERENCES

.1 ASTM International (ASTM).

.1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A924/A924M-13, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 ASTM C1338-14 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

.4 ASTM D1622/D1622M-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.5 ASTM D2842-12, Standard Test Method for Water Absorption of Rigid Cellular Plastics.

.6 ASTM D6226-10, Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

.7 ASTM E96/E96M-13, Standard Test Methods for Water Vapor Transmission of Materials.

.2 Underwriters' Laboratories of Canada (ULC):

.1 CAN/ULC S705.1-01, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material Specification.

.2 CAN/ULC S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Application.

.3 On-Site Documentation:

.1 Maintain a copy of the manufacturer's technical manual on site during application of polyurethane foam.

.2 Maintain copy of Daily Reports on site during application.

1.3 SEQUENCE AND SCHEDULING

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Scheduling:

.1 Prior to commencing work of this section arrange for manufacturer’s technical representative to review with Contractor and Departmental Representative, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Product Data:

.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for this Project. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and patching compound and other materials later designated later by Departmental Representative.

.3 Samples:

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Provide two 300 mm x 300 mm samples of finished product.

.4 Quality Assurance/Control Submittals:

.1 Certificates:

.1 Sprayed polyurethane foam (SPF) installer certificate: Submit name of SPF installer with copy of certification card verifying that the SPF installer is licensed by the source manufacturer.

.2 Manufacturer's Certificate: Certify that Products meet or exceed physical characteristics identified as evidenced by a current CCMC Evaluation Report certifying the polyurethane foam product for use as an air barrier component is in accordance with the National Building Code of Canada.

.2 Test and Evaluation Reports:

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

.3 Field or Site Quality Control Submittals:

.1 Submit following reports to Departmental Representative when requested:

.1 Testing Reports: Submit as performed by manufacturer’s approved testing agency and as required by CAN/ULC S705.2.

.2 Daily Reports: As required by CAN/ULC S705.2.

.3 Adhesion tests at transition membranes as per SPF manufacturer’s application guidelines for air barrier system.

.4 Compatibility Verification:

.1 Submit letter from SPF manufacturer verifying compatibility between the spray applied insulation and the air/vapour retarder products specified in Section 07 27 10.

.5 Installation Procedures:

.1 Submit installation procedures that are to be used on this project that will ensure proper and adequate bonding of SPF insulation to air/vapour retarder membrane, transition membranes and thru-wall flashing membranes.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
  .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  .3 For products not identified on list, source products with highest recycled content available when practical.
  .4 Include following information with product data submission.
    .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
  .1 Include following information with Product Data submission for materials specified under this section:
    .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
  .1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
  .2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
    .1 Interior and Exterior Paints: GS-11
    .2 Anti-Corrosive Paint: GS-11
    .3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.
  .3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 QUALITY ASSURANCE

.1 Regulatory and Sustainable Approvals.
  .1 Listed with Canadian Construction Materials Centre (CCMC) certifying the product for use as an air barrier system in accordance with the National Building Code of Canada 2010.
  .2 Greenguard Indoor Air Quality Certified under the Greenguard for Children and Schools program.

.2 Qualifications:
- .1 Contractor performing work under this section must be licensed by the SPF manufacturer.
- .2 Installers:
  - .1 Installer shall be licensed and trained by SPF manufacturer.
- .3 Adhesion Testing:
  - .1 Perform adhesion test in accordance with SPF manufacturer's Application Guidelines and CCMC report.
  - .2 Conduct adhesion testing between the transition membranes and substrates for compliance in accordance with the manufacturer's guidelines for use in an air barrier application.
  - .3 Conduct adhesion testing between the polyurethane foam and transition membranes and substrates for compliance in accordance with the manufacturer's guidelines for use of SPF in an air barrier application, and to CAN/ULC-S705.2.
  - .4 Report non-compliant test results along with corrective action taken to manufacturer and include in daily report.

.3 Arrange for site reviews by manufacturer's technical representative. Schedule the minimum number of site reviews in accordance with the following schedule:

Coverage Area, sq. m. (sq. ft.)	No. of Site Reviews
1 – 2,323 (1 – 25,000)	1
2,324 – 4,645 (25,001 – 50,000)	2
4,646 – 6,968 (50,001 – 75,000)	3
over 6,968 (over 75,000)	4+

.4 Mock-ups:
- .1 Participate in construction of exterior wall mock-ups by providing spray-in-place urethane foam insulation as necessary for each mock-up.
- .2 Make modifications to construction and procedures as determined by Departmental Representative based upon review of mock-up.
- .3 When accepted by Departmental Representative, mock-up will demonstrate minimum standard for this work.
- .4 Do not commence work until mock-up has been accepted.
- .5 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application. Any need for deviation from the accepted mock-up shall be requested in writing.
- .6 Upon Departmental Representative*'s* request, provide in writing, manufacturer's acceptance of the mock-up quality.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
- .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
  - .1 General maximum VOC 25g/L.
  - .2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Delivery and acceptance requirements:

.1 Comply with material manufacturer's ordering instructions and lead time requirements to avoid delays.

.2 Packaging and waste management:

.1 Dispose of waste foam daily in designated location and decontaminate empty drums in accordance with foam manufacturer's instructions.

1.9 FIELD AND SITE CONDITIONS

.1 Ambient conditions:

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

1.10 WARRANTY

.1 Warrant work of this Section for period of two (2) years against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Departmental Representative and at no expense to Departmental Representative. Defects include but are not limited to; leakage, opening of seams, bond failure, delamination.

2 Products

2.1 MATERIALS

.1 Polyurethane foam: to CAN/ULC S705.1, including amendments, closed cell, spray-applied rigid cellular polyurethane foam insulation, medium density. Cured foam shall function as air barrier and vapour retarder in addition to providing thermal value.

.1 Acceptable Materials: Heatlok Soya by Demilec; Walltite ECO v.3 by BASF.

.2 Performance Requirements:

.1 Water Vapour Permeance (ASTM E96) (core only): maximum 41 ng/Pa•s•sq m (0.68 Perms).

.2 Flame Spread Classification (CAN/ULC S102): Flame Spread < 500,

.3 Smoke Developed <500.

.4 Fungi Resistance (ASTM C1338): No fungal growth after 28 day incubation.

.5 Long Term Thermal Resistance (LTTR): Conform to the following when tested to CAN/ULC S770.

.1 Minimum RSI 2.1 @ 50 mm.

.3 Physical Requirements:

.1 Colour: manufacturer's colour indicating compliance with CAN/ULC S705.1.

.2 Density (ASTM D1622): Minimum 28.9 kg/cu m (1.8 lb/cu ft).

.3 Open Cell Content (ASTM D6226): maximum 6.0 %.

.4 Water Absorption (ASTM D2842): maximum 0.8 % by volume.

.4 Sustainable Requirements:
.1 Zero ozone depleting blowing agents.
.5 Material containers shall be labeled with the Evaluation Report number of the evaluation agency.

.2 Air/vapour retarder, transition membrane and thru-wall flashing: as specified in Section 07 27 10 - Air / Vapour Retarder.

.3 Metal closure: 0.76 mm base steel thickness; to ASTM A653/A653M, having a core of Grade 230 steel; zinc-coated in accordance with ASTM A924/A924M to a Z275 designation.

.4 Fasteners: type to suit substrate.

2.2 EQUIPMENT

.1 Comply with CAN/ULC S705.2 and the equipment manufacturer's recommendations for specific type of application.

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

3 Execution

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Departmental Representative in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

.2 Ensure surfaces are free of frost, oil, rust and other foreign matter which may affect bond.

.3 Ensure that work by other trades that may penetrate through the air barrier system is in place and complete before starting application. The elements include but are not limited to the following:
.1 Brick ties.
.2 Z bar.
.3 Firestop.
.4 Flashing.
.5 Mechanical and electrical work.
.6 Primer.

.4 Ensure transition membranes and through-wall flashings are installed before polyurethane foam application.

3.2 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC S705.2 and SPF manufacturer's printed instructions.

.2 Finished surface of insulation shall be free of voids and imbedded foreign objects.

3.3 PREPARATION

.1 Protection:
.1 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

.2 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
.3 Protect workers as recommended by insulation manufacturer.
.4 Mask and cover adjacent surfaces and equipment to protect from damage by overspray.

.2 Surface Preparation:
.1 Prepare surfaces in accordance with manufacturer's instructions and CAN/ULC S705.2.
.2 Prime metal and non-porous surfaces when required by SPF manufacturer's written instructions.
.3 Apply primer in accordance with manufacturer's written instructions.

.3 Metal closure:
.1 Install metal closure angles at perimeter of frames.

3.4 INSTALLATION

.1 Apply insulation in accordance with CAN/ULC-S705.2 and manufacturer's written instructions.

.2 Apply insulation by spray method, to a uniform monolithic density without voids.
.1 Lift thickness: first lift to be maximum 25 mm thickness; remaining lifts not to exceed 50 mm thickness in a single pass.

.3 Apply to a minimum cured thickness as indicated on drawings.

.4 Overlap air barrier transition membranes, thru-wall flashing and other air/vapour retarder materials to ensure continuity of building envelope.

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

.6 Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened.

3.5 TOLERANCE

.1 Applied product to have an average thickness of -0 mm to +6mm as per thickness requirements, at minimum of 9 readings in 1 m^2 for each 150 m^2 surface sprayed.

3.6 REPAIR

.1 Repair damaged areas in accordance with SPF manufacturer's application guidelines for insulation in an air barrier.

3.7 FIELD QUALITY CONTROL

.1 Licensed installer shall conduct daily visual inspection, adhesion testing and density measurements as required by CAN/ULC S705.2 and the manufacturer's application guidelines for air barrier system. Costs incurred for daily testing and inspection by the Licensed Installer and the completion of the Daily Work Record shall be borne by the Licensed Contractor.

.2 Where adhesion strength of transition membrane is less than that permitted by SPF manufacturer mechanically fasten the transition membrane to substrate in accordance with manufacturer's application guidelines for air barrier system.

.3 Site Tests

.1 The Licensed Installer shall conduct daily visual inspection, adhesion/cohesion testing and density measurements as outlined in CAN/ULC S705.2.

.2 The Licensed Installer shall complete the Daily Work Record and record all information required including the results of the testing. The Daily Work Record shall be kept on site for routine inspection. Copies of the Daily Work Record shall be forwarded to the owner or owner's representative upon request. Copies of the Daily Work Record or monthly summaries shall be sent to the SPF Quality Assurance Program office on a monthly basis as required by the Quality Assurance Program.

3.8 PROTECTION

.1 Do not permit subsequent construction work to disturb applied polyurethane foam.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 07 21 19 - Spray Applied Insulation.

1.2 REFERENCES

.1 ASTM International (ASTM).
  .1 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Underwriters Laboratories of Canada (ULC).
  .1 CAN/ULC-S124-06, Standard Method of Test for the Evaluation of Protective Coverings for Foamed Plastic.

1.3 QUALIFICATIONS OF APPLICATOR

.1 Application of spray-applied thermal barrier only by applicators certified by material manufacturer as being a qualified installer of their material.

1.4 SUBMITTALS

.1 Submit samples in accordance with Section 01 10 01 - General Requirements.

.2 Submit product data and indicate design thickness required to meet CAN/ULC-S124, Classification B.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
  .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  .3 For products not identified on list, source products with highest recycled content available when practical.
  .4 Include following information with product data submission.
    .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 PROTECTION

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

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Apply materials only when surfaces and ambient temperatures are within prescribed limits.

2 Products

2.1 THERMAL BARRIER

.1 Thermal barrier: cementitious based, asbestos free, to CAN/ULC-S124; of type compatible with spray applied insulation.

.2 Fire test performance: when tested in accordance with ASTM E84, shall have maximum values as listed below.

.1 Flame Spread: 10.

.2 Smoke Developed: 0.

.3 Fuel Contributed: 0.

.3 Primer: of type recommended by manufacturer.

.4 Water: clean, potable and free from any deleterious substances.

3 Execution

3.1 PREPARATION

.1 Inspect surfaces to receive thermal barrier. Notify Departmental Representative of unsuitable surfaces.

.2 Commencement of work indicates acceptance of surfaces.

3.2 APPLICATION

.1 Apply thermal barrier to clean, dry surfaces only after all clips, hangers, sleeves and similar devices have been attached.

.2 Apply thermal barrier to obtain design thickness.

.3 Apply in accordance with manufacturer's printed instructions.

END OF SECTION

1 General

1.1 RELATED SECTION

.1 Section 07 21 19 - Spray Applied Insulation.

1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .2 ASTM E96/E96M-13, Standard Test Methods for Water Vapor Transmission of Materials.
- .3 ASTM E283-04(2012), Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Product data:
- .1 Submit manufacturer’s product data and installation instructions for all components of air/vapour retarder system.

.3 Shop drawings
- .1 Submit shop drawings of air/vapour retarder system including details of typical conditions, intersection and transitions with other envelope systems and materials.

.4 Compatibility verification:
- .1 Submit letter from air/vapour retarder manufacturer verifying compatibility between air/vapour retarder products and the spray applied insulation specified in Section 07 21 19 - Spray Applied Insulation.

1.4 MOCK-UP

.1 Construct mock-up in accordance with Section 01 10 01 - General Requirements.

.2 Construct two (2) typical exterior wall panels (one with gypsum sheathing substrate and one with masonry substrate), 4 m long by 2 m high at locations acceptable to Departmental Representative.

.3 Mock-ups shall incorporate:
- .1 Interface at window and door frame.
- .2 Detailing at interior and exterior building corner.
- .3 Sealing of joints and penetrations.
- .4 Fastener type, application and spacing.

.4 Mock-ups may remain as part of the Work.

.5 Allow Departmental Representative 48 h for site observation of mock-up. Do not proceed with work until Departmental Representative has accepted mock-up. Make changes to mock-up as requested by Departmental Representative at no increase in contract price.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
  .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  .3 For products not identified on list, source products with highest recycled content available when practical.
  .4 Include following information with product data submission.
    .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
  .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
  .1 Include following information with Product Data submission for materials specified under this section:
    .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 QUALITY ASSURANCE

.1 Use only one applicator and one brand of material for entire project.

.2 Have manufacturer's technical representative do site inspection of the installation. Do not cover air/vapour retarder until manufacturer's technical representative has approved the installation and has issued a letter to the Departmental Representative stating that material and installation methods are in accordance with manufacturer's recommendations and specifications.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    .1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.
.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of materials defined as hazardous or toxic waste in designated hazardous waste disposal site.

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.10 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.11 WARRANTY

.1 Provide a five (5) year warranty which includes coverage of installed air/vapour retarder, sheet materials and accessories which fail to achieve air, water and vapour tight seal, exhibit loss of adhesion or cohesion, or do not cure.

2 Products

2.1 PRODUCT COMPATIBILITY

.1 Products used in air/vapour retarder system shall be compatible with and approved by spray-applied insulation manufacturer.

2.2 FLUID-APPLIED MATERIALS

.1 Air/Vapour retarder: single component, fluid applied, elastomeric membrane; spray, trowel or roller application; meeting the following performance requirements:
.1 Water Vapor Transmittance (ASTM E96/E96M): Maximum 0.1 perms.
.2 Rate of Air Leakage (ASTM E283): Maximum 0.02 $l/s \cdot m^2$ @ 75 Pa.
.3 Surface Burning (ASTM E84):
.1 Flame spread <25
.2 Smoke developed < 450
.4 Acceptable Materials: Enershield-I by BASF, Air-Bloc 32 by Henry Company.

.2 Block filler: one-component, water-based block filler.

.3 Sheathing fabric: reinforced non-woven polyester fabric.

.4 Transition membrane: self-adhesive membrane as specified in 2.3.1.

.5 Thru-wall flashing: wall flashing membrane as specified in 2.3.2.

2.3 SHEET MATERIALS

.1 Self-adhesive membrane: SBS modified asphalt with polyester or cross laminated polyethylene face.
- .1 Water vapour permeance: 2.8 ng/Pa·m^2·s (0.05 perms) when tested in accordance with ASTM E96/E96M.
- .2 Acceptable Materials: TF Membrane by BASF, Blueskin SA by Henry Company, Aquabarrier AVB by IKO, Sopraseal Stick 11T by Soprema.

.2 Wall flashing membrane: SBS modified asphalt with polyester or cross laminated polyethylene face; designed specifically for thru-wall flashing and incorporating thicker polyethylene face.
- .1 Water vapour permeance: 2.8 ng/Pa.m^2.s (0.05 perms) when tested in accordance with ASTM E96/E96M.
- .2 Water absorption: maximum 1%.
- .3 Acceptable Materials: Enershield-TWF by BASF, Blueskin TWF by Henry Company, Aquabarrier TWF by IKO, Sopraseal WFM by Soprema.

.3 Accessories:
- .1 Primer: emulsion type primer as recommended by air barrier manufacturer.
- .2 Sealant: of type recommended by air/vapour retarder manufacturer.

3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section.

.2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air/vapour retarder manufacturer's requirements.

.3 Ensure wall sheathing is securely fastened.

.4 Report unsatisfactory conditions to the Departmental Representative in writing.

.5 Do not start work until deficiencies have been corrected. Commencement of Work implies acceptance of conditions.

3.2 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application.

.4 Ensure metal closures are free of sharp edges and burrs.

3.3 MIXING

.1 Mix fluid-applied air/vapour retarder in accordance with manufacturer's instructions.

.2 No additives are permitted unless specified in product mixing instructions. Close containers when not in use.

.3 Prepare in container that is clean and free of foreign substances. Do not use container which has contained or been cleaned with a petroleum-based product.

3.4 APPLICATION

.1 Apply products in accordance with manufacturer's current application procedures and in accordance with project requirements.

.2 Fluid-applied installation:

.1 General:

.1 Apply fluid-applied air/vapour retarder system, in two coats, to provide full coverage over substrate at thickness recommended by manufacturer.

.2 Transitions:

.1 Use transition membrane at transitions between different substrates, at movement joints and to tie-into frames and other penetrations.

.2 Non-moving joints within common substrates may be treated using fabric-reinforced transitions. If using roller, brush, or trowel application, allow fabric-reinforced transitions to dry to touch before applying first coat of air/vapour retarder to entire wall surface. If spraying, "wet on wet" application is acceptable.

.3 Prior to application of the second coat, visually inspect to ensure that surface is free of blisters and coating is free of voids and pinholes. Repair as necessary, then apply second coat after initial coating is sufficiently dry.

.2 Sheathing substrate.

.1 Treat non-moving joints in sheathing by embedding sheathing fabric in wet air/vapour retarder then saturating fabric with air/vapour retarder.

.2 Use transition membranes at openings such as window, doors and louvres.

.3 Apply seal coat over exposed fastener heads before installation of first coat of vapour retarder.

.3 Masonry substrate.

.1 Treat non-moving joints by embedding sheathing fabric in wet air/vapour retarder then saturating fabric with air/vapour retarder.

.2 Apply additional thickness of fluid-applied air/vapour retarder, as may be necessary to produce acceptable results, to block surfaces having a high porosity.

.3 Membrane installation:

.1 Apply membrane, beginning at base of wall. Overlap layers of membrane in shingle-like fashion.

.2 Overlap horizontal and vertical joints minimum 50 mm.

.3 Roll entire membrane, including seams, firmly and completely as soon as possible to ensure proper contact.

.4 Detail work:

.1 Cut membrane to fit around penetrations and apply bead of sealant to seal voids which may have been caused by fitting of membrane.

.2 Tie membrane into window and door frame interface sheet, to maintain continuity of air/vapour retarder. Position lap seal over firm bearing.

.3 Coordinate installation of wall air/vapour retarder with roof vapour retarder to maintain continuity.

.5 Thru-wall flashing:

.1 Check top of foundation walls for projections which might puncture flashing material.

.2 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, steel angles over openings, and elsewhere as indicated. Install flashings under weep hole courses.

.3 Carry flashings from front edge of masonry, under outer wythe, then up backing not less than 200 mm.

.4 Lap joints 50 mm.

.5 Seal joint at top of membrane with sealant.

.6 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.5 MEMBRANE INSPECTION AND REPAIR

.1 Visually inspect air/vapour retarder system for voids, pinholes, surface deficiencies, etc. Repair deficiencies and areas that are not intact.

.2 Have membrane manufacturer's technical representative inspect air/vapour retarder system upon completion.

.3 Correct damaged and defective areas immediately.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 05 05 13 - Fluoropolymer Coating.

.2 Section 07 21 13 - Board Insulation.

.3 Section 07 42 43 - Composite Aluminum Panels.

.4 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

.1 ASTM International (ASTM).

.1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A924/A924M-13, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 ASTM D2244-14, Standard Practice for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates.

.4 ASTM D4214-07(2015), Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

.2 Canadian Standards Association (CSA):

.1 CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.

1.3 DEFINITIONS

.1 Custom colours: colours not normally produced by the industry and have not been assigned a colour number.

.2 Special colour range: colours produced by the industry that have been assigned a colour number; but, are more costly to produce than "standard colour range".

.3 Standard colour range: colours produced by the industry that are currently popular and/or cost effective, and have been assigned a colour number, and are available for the gauge specified. Colours may or may not be in stock by manufacturer.

.4 Stock colour range: colours in stock by an individual manufacturer for the gauge specified.

1.4 DESIGN CRITERIA

.1 Design exterior metal panel system in accordance with CSA S136.

.2 Allow for thermal movement of component materials caused by ambient temperature range of 80°C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.3 Design members to withstand dead load and wind loads calculated in accordance with NBC and applicable local regulations, to maximum allowable deflection of 1/180th of span.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Shop drawings:

.1 Indicate elevations, dimensions, type and gauge of material, finish; details at openings, changes in plane and penetrations; spacings of sub-girts and fasteners; fasteners and installation method, compliance with design criteria, and all other relevant details and data.

.3 Samples:

.1 Submit duplicate 600 mm x 600 mm samples of each panel representative of materials, finishes and colours.

1.6 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.

.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.

.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".

.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.

.3 For products not identified on list, source products with highest recycled content available when practical.

.4 Include following information with product data submission.

.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.

.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".

.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:

.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.

.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.

.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:

.1 Interior and Exterior Paints: GS-11

.2 Anti-Corrosive Paint: GS-11

.3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.

.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 Flooring Systems.

.1 Carpets: Submit manufacturer's certification indicating that Product is listed and approved under Carpet and Rug Institute's (CRI) Green Label Program or Green Label Plus Program.

.2 Hard Surface Flooring (including resilient base): Submit manufacturer's certification indicating that Product is listed and approved under FloorScore certification program.

.7 Composite Wood and Agrifibre Products.

.1 Provide composite wood and laminate adhesives specified herein manufactured with no added urea formaldehyde.

.2 Submit manufacturer's certification indicating no added urea formaldehyde.

.8 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Handle and store cladding and wall panels in accordance with manufacturer's written instructions to prevent stressing, warping, twisting or bending.

1.9 WARRANTY

.1 Panel manufacturer shall warrants steel panels coated with fluoropolymer coating that the Product shall perform as follows:

.1 Loss of Adhesion

.1 Will not crack, flake or peel (loss of adhesion) for a period of thirty-five (35) years. Cracking is defined as breaks in the flat coating as opposed to cracking or breaks in the film caused by metal forming which is accepted as standard.

.2 Chalk Rating:

.1 Will not chalk in excess of a number eight (8) rating as determined by ASTM D4214 at any time for a period of thirty (30) years.

.3 Fade Rating:

.1 Will not change color more than five (5.0) Hunter ΔE units as determined by ASTM D2244 at any time for a period of thirty (30) years.

2 Products

2.1 MATERIALS

.1 Galvanized steel sheet: fabricated in accordance with ASTM A653/A653M, having a core of Grade 230 (33) steel; zinc-coated in accordance with ASTM A924/A924M.
  .1 For metal wall panels:
    .1 Use coil stock specifically made for architectural flat.
    .2 Prefinish with finish system specified below.

2.2 METAL CLADDING

.1 Type: corrugated profile, rolled from prefinished Z275 galvanized sheet steel.
  .1 Nominal thickness: 0.45 mm
  .2 Depth: 22 mm.
  .3 Module: 68 mm o.c.
  .4 Finish: metallic fluoropolymer coating.

2.3 FINISH

.1 Fluoropolymer coating: as specified in Section 05 05 13 - Fluoropolymer Coating.

2.4 FLASHING AND TRIM

.1 Flashing and trim: of same material, thickness, finish and colour as panels.

.2 Provide all foam closure strips, drip caps, sills, flashings, ridge caps, metal closures and corners shown or required for a complete, watertight enclosure.

.3 In addition to above flashings, form and install flashings at transitions of metal panels with other materials.

2.5 ACCESSORIES

.1 Fasteners: concealed fasteners approved by manufacturer, to positively lock face sheet of panel to structural supports and provide positive resistance to negative wind loads.

.2 Sealant: factory apply 10 mm wide continuous bead of approved non-skinning butyloid gun grade sealant in female side at panel joint.

.3 Furring channels: fabricated from commercial grade steel with Z275 zinc finish. Thickness and spacing to suit conditions.

.4 Exposed screws: zinc coated steel, head colour same as exterior sheet, dished steel/neoprene washer.

.5 Sealants/tape: as recommended by panel manufacturer for applicable application.

.6 Touch-up paint: as recommended by panel manufacturer. Colour to match.

.7 Isolation coating/tape: type as recommended by panel manufacturer.

2.6 FABRICATION

.1 Ensure rolling of siding and accessories do not cause stresses on products which could lead to oil-canning.
  .1 Roll former shall verify that products are good when rolled.
  .2 Exposed joint (perpendicular to profile): ends of cladding sheet shop cut clean and square.

3 Execution

3.1 INSTALLATION - GENERAL

.1 Installation shall be performed by qualified and experienced personnel. Installation contractor shall be certified by manufacturer.

.2 Install in accordance with CSSBI standards, manufacturer's written instructions and shop drawings and as indicated.

.3 Apply sealant/tape using hidden application unless otherwise directed.

.4 Where horizontal joints are required, overlap joints in direction of water-flow and make watertight.

.5 Cut necessary openings for mechanical, electrical and other penetrations and openings. Make joints around penetrating items perfectly tight.

.6 Install flashing and trim as required for complete, watertight enclosure.

.7 Use maximum practical length of panel to keep number of end laps to a minimum.

.8 Install components to allow for thermal expansion and contraction.

.9 To prevent oil-canning, do not use panels that have been stressed.

.10 Do not overdrive fasteners, so as to limit amount of thermal movement or to physically deform panel at fastener location.

3.2 METAL CLADDING INSTALLATION

.1 Provide subframing, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to insulated metal wall panel. When installing cladding horizontally, fasten vertical framing members to back-up. Screw spacing as recommended by cladding manufacturer.

.2 Install isolation tape to provide thermal break in sub framing system.

.3 Install exterior panels with fasteners as specified. Stitch side laps with screws between girts. Use sufficient pressure to install screws without buckling the sheets.

.4 Install notched, shaped and waterproof closures in order to protect the exterior components against the effects of the weather.

.5 Provide alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to building structure.

.6 Hem exposed edges of sheet metal, except profiled sheets, a minimum of 13 mm toward the inside. Exposed bare edges are not acceptable.

3.3 TOLERANCES

.1 Maintain following installation tolerances:

- .1 Maximum variation from plane or location shown on reviewed shop drawings: 10 mm/m of length and up to 20 mm/100 m maximum.
- .2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

3.4 ADJUSTING AND CLEANING

.1 Touch up panels and supports at all minor abrasions.

.2 Replace panels damaged beyond repair with new. Departmental Representative's decision as to which panels are to be replaced shall be final.

3.5 CLEANING

.1 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.2 Remove excess sealant with recommended solvent.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 05 05 13 - Fluoropolymer Coating.

.2 Section 07 21 13 - Board Insulation.

.3 Section 07 27 10 - Air / Vapour Retarder.

.4 Section 07 42 13 - Metal Wall Panels.

.5 Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.2 REFERENCES

.1 ASTM International (ASTM).

.1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A924/A924M-13, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

1.3 PERFORMANCE REQUIREMENTS (DESIGN CRITERIA)

.1 Panel: Metal panel shall be designed so that all finishes, support and attachment systems use a basic "reference velocity wind pressure" of 0.45 kPa. This value shall be multiplied by the factors and coefficients defined by the National Building Code and its supplements. The maximum total (positive plus negative) wind pressure to be designed under the code shall be 2.25 ka for all locations not higher than 12 metres above grade.

.2 Deflecting Movement: Maximum deflection not to exceed L/180. The panel shall exhibit no permanent deformation when subjected to these loads. Allowance shall be made in the panel design for movement within the system caused by deflection in the building structure.

.3 Thermal Movement: make allowance for expansion and contraction of all parts of the metal panel assembly caused by surface temperatures varying from minus 40°C to plus 60°C. Such variation in temperature shall not cause buckling, stresses on enclosed or adjoining materials and fasteners, or in any way impair the performance or appearance of the system. Fabrication, assembly, and erection procedure shall account for the ambient temperature at the time of the respective operation.

.4 Weep Drainage: Clear internal paths of drainage in order to drain any trapped moisture to the exterior.

.5 Water Tightness: Exterior fascia and wall panels shall be designed to the rain screen principles as published by the National Research Council and prevent water infiltration into the interior systems.

.6 Fastening: fasten panel assembly to the building structure in a manner which transmits all loads to the main structure without exceeding the capacity of any fastener.

.7 Building movement: the panel system shall be designed to incorporate all potential building lateral movement and slab deflections, including required expansion requirements between the tower/link and link/adjacent buildings.

.8 Pressure equalization: panel system is to be a pressure equalized rain screen type. Manufacturer shall fully document and verify the system and details to ensure compliance with this design requirement.

1.4 FIELD QUALITY CONTROL

.1 Inspection: Intermediate inspections of air barriers and insulation shall be carried out by the manufacturer's representative prior to the enclosure and concealment of these products in the system.

.2 All walls and openings are to be within ±3 mm of location shown on architectural drawings. Also, structure is to be plumb within 1:1000 of overall height.

.3 Final inspection and approval of completed work shall be carried out by manufacturer's representative, contractor and Departmental Representative.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Samples:

.1 Assembly sample: provide panel assembly sample, not less than 600 mm x 600 mm, showing as a minimum: 4-way joint, clips, anchors, supports, fasteners, closures and other panel accessories. Construct from composite panels in thickness and core as specified from any available colour.

.2 Colour/finish samples: Include separate sets of drawdown samples on aluminum substrate, not less than 75 mm × 75 mm, of each color and finish selected for colour approval. Provide larger samples as requested by Departmental Representative.

.3 Shop Drawings: clearly indicate by reflected ceiling plans, wall elevations and sectional details all material thicknesses, finishes, connections, inserts, joint conditions, method of anchorage, number of anchors, support fastenings, reinforcements, method of supporting and integrating mechanical and electrical fixtures, trim and accessories.

.4 Design: Calculations shall be signed and sealed by a professional engineer who is licensed to practice in the Province of New Brunswick, attesting to the ability of the metal panel assembly to withstand the specified loads, including positive and negative loads and fastening loads to the structure.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Cover prefinished components to protect surface finishes from damage and deterioration in transit.

.2 Store components off ground to prevent twisting, bending and defacement. Slope to shed moisture.

.3 Remove protective film coating and clean panels as the work progresses.

1.7 MOCK-UP

.1 Provide mock-up in accordance with Section 01 10 01 - General Requirements.

.2 Construct mock-up in area selected by Departmental Representative. Size to be minimum four (4) panels in a two over two configuration.

.3 Mock-up shall show complete panel system, including but not limited to metal furring, panels, securement devices, window detailing, sealants and moulding. Finish to be actual finish scheduled for project.

.4 Modify mock-up as necessary for Departmental Representative. Mock-up may remain in place as part of competed work.

1.8 WARRANTY

.1 Exterior wall assembly to be warranted for a period of five (5) years from the date of final completion against air/water leakage (building side of air barrier), corrosion, material and system performance defects and failures.

2 Products

2.1 PANEL SYSTEM

.1 Prefinished composite aluminum panel system, rain-screen system with "Dry"" joints.
.1 Acceptable Materials: Alpolic Rain Screen System by VicWest, SL2000 Dry Joint System by Sobotec.

2.2 MATERIALS

.1 Composite Panels: 4 mm prefinished composite panel consisting of two 0.5 mm thick aluminum face sheets bonded to fire resistant core without use of glues or adhesives, and approved for use in non-combustible construction.
.1 Acceptable Materials: Alpolic FR by Mitsubishi Chemical, 2000 by Sobotec Ltd, Alucobond Plus by 3A Composites USA.

.2 Aluminum face sheets: alloy AA-3003.

.3 Aluminum extrusions: alloy AA-6063-T5.

.4 Galvanized steel sheet: fabricated in accordance with ASTM A653/A653M, having a core of Grade 230 (33) steel; zinc-coated in accordance with ASTM A924/A924M to a Z275 designation

2.3 ACCESSORIES

.1 Fasteners and clips: Concealed stainless steel, corrosion free, supplied in accordance with manufacturer's recommendations to meet the load requirements specified and maintain a weathertight installation.

.2 Insulating Butyl Tape: Applied to contacting surfaces between dissimilar metals and between metals and concrete or masonry.

.3 Sub-girts: Z or U shaped, fabricated from galvanized sheet steel; minimum 1.0 mm thickness, centers shown on the drawings. Supply complete with weep holes to facilitate drainage.

.4 Flashings: Wherever practical at corners, window jambs, window sills, window heads and abutments, no flashing will be permitted. Panel design to include for these connections.

.5 Miscellaneous accessories: As required to complete project; in accordance with material and manufacturer's recommendations.

2.4 FINISHES

.1 Finish: Fluoropolymer coating as specified in Section 05 05 13 - Fluoropolymer Coating.

2.5 FABRICATION

.1 Factory fabricated panels.

.2 Tolerances:
.1 Panel bow: maximum 0.8% of panel dimension in width and length.

.2 Panel dimensions: where final dimensions cannot be established by field measurement before completion of panel manufacturing, make allowance for field adjustments as recommended by manufacturer.

.3 Panel lines, breaks and angles: sharp, true and surfaces free from warp or buckle.

.3 Fabrication: fabricate with straight lines, square corners or smooth bends, free from twists or warps, kinks, dents or other imperfections which may affect appearance or serviceability.

.4 Panel flatness tolerance (in all directions across the surface): maximum 0.2%.

.5 System shall have a flush appearance from the exterior with no surface fixings or other irregularities and with no reveal other than the module joint width.

.6 Align panels with no lap or reveal other than joint width to permit expansion and contraction.

.7 Thickness of metal and details of assembly and support shall provide sufficient strength and stiffness to resist distortion of finished surface. Dress exposed edges and ends of metal smooth, and free from sharp edges. Construct connections and joints exposed to weather to exclude water.

.8 Construct panels with flanges on all sides. Factory-notch panel corners and butt neatly. Extrusions shall be of manufacturer's proprietary design, shape, and size to suit panel sizes and location of supporting substructure. Extrusions shall frame the panels and support the spline.

.9 Provide and coordinate openings with work of other sections. Cut holes prior to finishing. Reinforce holes greater than 300 mm x 300 mm in accordance with manufacturer's instructions.

.10 Reveal: reveal width (spacing between panel edges) to be 16 mm unless indicated otherwise. Reveal material and colour to match panels.

3 Execution

3.1 PREPARATION

.1 Develop dimensions from drawings and coordinate with field dimension to obtain final panel layout.

3.2 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Departmental Representative in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.3 INSTALLATION

.1 Coordinate installation with all requirements for a pressure equalized rain screen assembly, including through-wall flashings.

.2 Support system shall be attached to the structure as required to transmit load designs.

.3 Use adjustable angles, clips, tees and associated bolts, anchors and other fixings to compensate for fabrication and erection tolerances of primary structure.

.4 Install framing and other components straight to match plane of panel as required to meet the installed panel tolerances with straight, sharply formed edges.

.5 Set aside, for refabrication/replacement, component parts that are observed to be defective, including warped, bowed, dented, abraded, and broken members.

.6 Return component parts which require alteration to shop for refabrication, if possible, or for replacement with new parts. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance.

.7 Erect panels plumb, level, and true with following installation tolerances:
- .1 Installed panels shall not deviate from overall plane or alignment by more than 1:1000.
- .2 Joints:
  - .1 Not less than their dimensioned width.
  - .2 Not more than five percent greater than their dimensioned width at any location along their full length
  - .3 Shall not be wavy, out of line or of different width from panel to panel.

.8 Install panels to structural supports by hidden mechanical fasteners.

.9 Separate dissimilar metals and use gasketed fasteners where needed to eliminate possibility of corrosive or electrolytic action between metals.

3.4 ADJUSTING AND CLEANING

.1 Remove and replace panels damaged beyond repair as a direct result of the panel installation.

.2 Repair panels with minor damage.

.3 Remove masking (if used) as soon as possible after installation.

.4 Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.

.5 Remove all excess materials, debris and equipment at completion.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 21 13 - Board Insulation.

1.2 REFERENCES

.1 Underwriters Laboratories' of Canada (ULC).
  .1 CAN/ULC-S702-14, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 DESIGN REQUIREMENTS

.1 Design panels and assembly to provide for thermal movement of component materials caused by ambient temperature range of 80°C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.2 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.3 Design members to withstand dead load and wind loads as calculated in accordance with NBC and applicable local regulations, to maximum allowable deflection of 1/180 of span.

.4 Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".

.5 Design wall system to accommodate specified erection tolerances of structure.

.6 Maintain following installation tolerances:
  .1 Maximum variation from plane or location shown on approved shop drawings: 10 mm/m of length and up to 20 mm/100 m maximum.
  .2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

1.4 QUALITY ASSURANCE

.1 Installation shall be performed using manufacturer trained contractor.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 10 01 - General Requirements.

.2 Indicate elevations, dimensions, thicknesses of material, finish; details at openings, changes in plane and penetrations; spacings; fasteners and installation method, type of insulation; compliance with design criteria, and all other relevant details and data.

.3 Each shop drawing submitted shall bear stamp of qualified professional engineer registered or licenced to practice in New Brunswick.

1.6 SAMPLES

.1 Submit samples in accordance with Section 01 10 01 - General Requirements.

.2 Submit duplicate 600 mm x 600 mm samples of wall system, representative of materials, finishes and colours.

1.7 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
- .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
- .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.8 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
- .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
  - .1 General maximum VOC 25g/L.
  - .2 Electrical apparatus components and electronic components.
  - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
- .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
- .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store panels under cover, out of direct sunlight in a dry location.

.2 Stack panels flat, no more than 500 mm high; maximum two stacks on top of each other. Use foam protection between each panel.

.3 Lift panels directly off stack, taking care at all times to avoid sliding.

.4 Carry panels on their edge.

1.10 JOB MOCK-UP

.1 Construct portion of mock-up associated with this section.

.2 Cooperate with other trades in construction of mock-up.

1.11 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.

1.12 WARRANTY

.1 Panel manufacturer warrants, for a period of ten (10) years, that all mineral fibre reinforced cementitious panels will comply with relevant quality characteristics of applicable standards EN 12467 / DIN 18202.

2 Products

2.1 MATERIALS

.1 Fibre reinforced cement panels:
- .1 Composition: proprietary mixture of glass fibre reinforcing and concrete.
- .2 Size: 10 mm thick x width and height indicated on drawings.
- .3 Acceptable Materials: Fibre C by Rieder, Swiss Pearl by Eternit.

.2 Mineral fibre insulation: to CAN/ULC-S702, semi-rigid board, 32 kg/m^3 density, minimum 35% recycled content.

.3 Aluminum extrusions: Aluminum Association alloy AA6063-T5.

.4 Fixing assemblies:
- .1 Framing: proprietary system, consisting of vertically mounted "hat" shaped supports at panel joints; "Z" shaped elsewhere. Thickness to suit loading.
- .2 Sub girts: "Z" shaped, mounted horizontally; thickness to suit loading.
- .3 Rivets: aluminum, saucer head; head colour matched to panel.

.5 Trim/closures:
- .1 Perforated: perforated aluminum, 0.7 mm thick; 2500 mm long x size indicated; colour to match panel.
- .2 Solid: 0.7 mm thick aluminum, prefinished to match panel.

.6 Cleaning solutions: only use solutions recommended by panel manufacturer that will not discolour panels.

2.2 FABRICATION

.1 Factory precut and predrill panels to maximum extent as possible.

.2 Do site cutting using tools and methods recommended by panel manufacturer.

.3 Factory seal faces and edges. Seal edges cut on site using sealer recommended by panel manufacturer.

3 Execution

3.1 INSTALLATION

.1 Install framing system using fasteners appropriate for substrate.

.2 Install insulation in accordance with Section 07 21 13 - Board Insulation.

.3 Install panels in accordance with manufacturer's instructions using exposed rivet system. Align rivets horizontally and vertically with adjacent rivet.

.4 Provide two fixed points per panel; remainder to be floating points to allow for thermal movement of panels. Locate fixed points on different panel supports.

.5 Make joints in framing at same location as panel joints. Framing joint locations are not permitted in middle of panel. Shim or otherwise adjust framing to provide flush panel faces, aligned in same plane.

.6 Use "dry" joints between panels; maintain joints at constant width of 6 mm. Provide colour matched closure behind joints.

3.2 CLEANING

.1 Wash surfaces exposed to view using running water and soft scrubber or microfibre cloth.

.1 Pressure washing may be utilized only when permitted by panel manufacturer and when done in strict compliance with manufacturer's instructions.

.2 Clean areas with contamination that cannot be removed by water alone using chemical solution.

.2 Remove panels which cannot be successfully cleaned and install new.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 07 62 00 - Sheet Metal Flashing and Trim.

.3 Section 27 15 01 - Antenna Communications Cabling: antenna mast.

1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM C209-12, Standard Test Methods for Cellulosic Fiber Insulating Board.
- .2 ASTM C920-14, Specification for Elastomeric Joint Sealants.
- .3 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .4 ASTM D41/D41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- .5 ASTM D1037-12, Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CGSB 37-GP-56M-80 (Amend), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 Canadian Roofing Contractors Association (CRCA).
- .1 CRCA Roofing Specifications Manual 2010, Latest edition.

.4 Canadian Standards Association (CSA).
- .1 CSA A123.3-05(R2010), Asphalt Saturated Organic Roofing Felt.
- .2 CAN/CSA-A123.4-04 (R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .3 CSA B272-93 (R2000), Prefabricated Self-Sealing Roof Vent Flashings.

.5 Factory Mutual (FM Global).

.6 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
- .2 CAN/ULC S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 10 01 - General Requirements.

.2 Product Data:
- .1 Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .1 Submit product data for roof membranes, asphalt, sealants, roof drain, vent stack covers, mechanical and electrical penetration sleeves.
  - .2 Asphalt product data shall identify equiviscous temperature (EVT), finished blowing temperature (FBT), and flash point temperature.

.2 Provide copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements, and indicate VOC content for:
.1 Primers.
.2 Asphalt.
.3 Sealers.
.4 Adhesives.

.3 Shop Drawings:
.1 Indicate control joints, tapered insulation mechanical fasteners and pattern and all related details.
.2 Provide layout for tapered insulation.

.4 Submit laboratory test reports certifying compliance of bitumens and fibreboard and membrane and insulation with specification requirements.

.5 Submit copy of work order indicating materials have been ordered and delivery dates.

1.4 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
.3 For products not identified on list, source products with highest recycled content available when practical.
.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.5 FIRE PROTECTION

.1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labelled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 10 m of torch applicator.

.2 Maintain a minimum fire watch for 1 hour after each days roofing operations cease and as according to Hot Works requirement of the Canadian Fire Code (latest edition).

.1 During work and at completion of days' work monitor for hot spots on roofs with heat detecting devices.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 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.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.

.4 Remove only in quantities required for same day use.

.5 Place plywood runways over completed work and existing roofs not under construction to enable movement of material and other traffic.

.6 Store sealants at +5°C minimum.

.7 Store insulation protected from daylight and weather and deleterious materials.

.8 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Do not install roofing when temperature remains below -18°C for torch application, or -5°C and in accordance with manufacturers' recommendations for mop application.

.2 Minimum temperature for solvent-based adhesive is -5°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 , the 12 months warranty period is extended to 60 months.

.2 Warranty shall cover leaks and defects that affect the functional performance of the work, which have occurred on or before the end of the warranty period and which are the result of faulty material and/or faulty workmanship on the part of the Roofing Contractor.

.3 Roofing contractor shall, at no cost to Departmental Representative, provide all material and labour necessary to remove and repair defective material and faulty workmanship.

2 Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

2.2 STEEL DECK COVERING

.1 Glass Mat, Gypsum Board: to ASTM C1177/C1177M, FM Class 1, UL 790; mold and moisture resistant; designed specifically as roof board.

.2 Fasteners for covering to deck: corrosion-resistant coated #2 Phillips, recessed head screws, complete with 75 mm diameter x 0.80 mm thick galvanized steel plates; Factory Mutual listed.

2.3 PRIMERS

.1 Asphalt primer: to CGSB 37-GP-9Ma and ASTM D41/D41M.

.2 Other primers: type as recommended by membrane manufacturer.

2.4 VAPOUR RETARDER

.1 Two-ply bituminous membrane consisting of:
- .1 No. 15 asphalt saturated organic roofing felts to CSA A123.3.
- .2 Type II or III asphalt to CAN/CSA-A123.4. Provide equiviscous temperature (EVT), finished blowing temperature (FBT), and flash point temperature.

2.5 MEMBRANES

.1 Fire Seal Membrane: to CGSB 37-GP-56M Styrene-Butadiene-Styrene (SBS) Elastomeric Polymer, reinforced; minimum thickness of 2.5 mm.
- .1 Type 2 - Covered Application.
- .2 Class C - Plain Surfaced.
- .3 Grade 2 - Heavy Duty Service.
- .4 Top and bottom surfaces: polyethylene/self-adhering with release paper.

.2 Base Sheet: to CGSB 37-GP-56M Styrene-Butadiene-Styrene (SBS) Elastomeric Polymer, prefabricated sheet, polyester reinforcement, weight 180 g/m^2, minimum thickness of 3.0 mm ± 0.2 mm.
- .1 Type 2 - Covered Application.
- .2 Class C - Plain Surfaced.
- .3 Grade 2 - Heavy Duty Service.

.4 Top and bottom surfaces: Polyethylene/sanded.

.3 Base Flashing: to CGSB 37-GP-56M Styrene-Butadiene-Styrene (SBS) Elastomeric Polymer, prefabricated sheet, polyester reinforcement, weight 180 g/m^2, minimum thickness of 3.0 mm ± 0.2 mm.
- .1 Type 2 - Covered Application.
- .2 Class C - Plain Surfaced.
- .3 Grade 2 - Heavy Duty Service.
- .4 Top and bottom surfaces: Polyethylene/polyethylene.

.4 Cap Sheet: to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, polyester reinforcement, weighing 250 g/m^2, overall thickness of 5 mm with minimum thickness of 4 mm ± 0.2 mm at selvage edge.
- .1 Type 1 - Exposed Application.
- .2 Class A - Granule Surfaced.
- .3 Grade 2 - Heavy Duty Service.
- .4 Bottom surface: polyethylene.

.5 Cap flashing: same as cap sheet.

.6 Walkway: same as cap sheet.

2.6 ISOCYANURATE (URETHANE) INSULATION

.1 Option I insulation: to CAN/ULC S704, Facing to be factory applied fibreboard and kraft paper, CFC free.
- .1 RSI: LTTR of 1.0 / 25 mm thickness.
- .2 Edges: shiplapped.
- .3 Density: 40 kg/m^3.
- .4 Shape: flat and tapered; thickness as indicated on drawings. Boards are to be a maximum of 1220 mm width x 1220 mm length

.2 Option II insulation: to CAN/ULC-S704, Facing to be factory applied kraft paper, CFC free.
- .1 RSI: LTTR of 1.0 / 25 mm thickness.
- .2 Edges: square.
- .3 Density: 40 kg/m^3.
- .4 Shape: flat and tapered; thickness as indicated on drawings. Boards are to be a maximum of 1220 mm width x 1220 mm length
- .5 Slope: 1% 2% as indicated on drawings.

2.7 INSULATING FIBREBOARD

.1 To CAN/ULC-S706, roof board, Type 2, Class 1, 12.5 mm or 25 mm, shiplapped, asphalt coated on two or six sides.
- .1 Density to ASTM D1037: 240 kg/m^3 minimum.
- .2 Water Absorption to ASTM C209: 3.25% maximum by volume.
- .3 Transverse load at rupture to ASTM C209: 44 N minimum.

2.8 CRICKETS

.1 Provide tapered shapes as indicated.

.2 Form shapes using fibreboard as specified by this Section, or:
- .1 Provide tapered polyisocyanurate insulation. Insulation to be by same manufacturer supplying flat insulation for use at field of roof.

2.9 SEALERS

.1 Modified bitumen mastic: as recommended by roofing membrane manufacturer.

.2 Sealing compound: rubber asphalt type.

.3 Sealants: to ASTM C920; Type M, Grade NS, Class 25.

2.10 ACCESSORIES

.1 Polyethylene back-up rope: extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa, compatible with primers and sealants, oversized 30 to 50%.

.2 Vent stack covers: to CSA B272, two-piece construction consisting of telescoping cap and preinsulated flange sleeve, spun aluminum construction, sized to suit vents. Fabricate from 1.6 mm thick 1100-0T aluminum alloy; mill finish. Factory coat flange with bituminous paint.

.1 Install sleeve 3 mm below vent stack and install sealant to vent stack, place cap onto bead of sealant to seal cap to vent stack over flange. Do not seal cap to vent stack until vent stack installation has been inspected.

.3 Antenna mast sleeve:

.1 Single-piece construction, spun aluminum sleeve and flange, 300 mm high x sized to suit mast diameter. Fabricate from 1.6 mm thick 1100-0T aluminum alloy; mill finish.

.2 Weather seal: EPDM pressure seal grommet between sleeve and mast.

.3 Coordinate mast opening diameter with Section 27 15 01 - Antenna Communications Cabling.

.4 Roof drain: 381 mm diameter coated cast iron body, clamp collar with integral gravel guard, roof sump receiver, and elevating body plate or underdeck clamp, aluminum dome; mechanical joint connection. Size to suit rain water leader system.

.5 Cants: premanufactured polyisocyanurate foam cant strips.

.6 Termination bar: extruded aluminum.

3 Execution

3.1 WORKMANSHIP

.1 Do examination, preparation and roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual and manufacturer’s written instructions.

.2 Do priming for asphalt roofing in accordance with manufacturers written instructions.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material, sheet metal or plywood, providing connection point for continuity of air barrier.

3.2 PROTECTION

.1 Cover walls 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 installed and connected.

.5 Protect all roof areas from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.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.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.3 EXAMINATION ROOF DECKS

.1 Inspect with Departmental Representative roof deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed. Report in writing any defects in structure or differences from details.

.2 Prior to commencement of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.

.2 Cants, curbs, dividers and blocking are installed and secure using galvanized fasteners.

.3 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.

3.4 PREPARATION OF STEEL DECK

.1 Mechanically fasten gypsum board covering to top flanges of steel deck using screws. A 2440 mm x 1220 mm sheet to have a minimum 10 fasteners per sheet in field of roof, 16 fasteners at perimeters and 32 fasteners in the exterior corners.

.2 Place with long axis of each gypsum sheet transverse to steel deck top flanges, with end joints staggered and fully supported on ribs.

3.5 PRIMING DECK

.1 Apply deck primer to gypsum board roofing substrate at the rate recommended by manufacturer or 2.5 L per 10 m^2.

3.6 VAPOUR RETARDER AND INSULATION

.1 Apply two-ply felt vapour retarder and insulation in accordance with CRCA Specifications SO-VR-1.

3.7 FIRE SEAL MEMBRANE

.1 Install fire seal membrane at all exposed wood and combustibles starting at the vapour retarder and covering the entire curb. Ensure wood is not exposed to flame. Prime wood surface with primer as recommended by manufacturer, fasteners maybe used to ensure a good adherence. Fire seal membrane is an underlay for the standard torch applied base sheet flashing and is to provide a continuous fire seal at wall/curb and roof junctions.

3.8 ROOF/WALL JUNCTION

.1 Notify Departmental Representative 48 hours prior to covering thru-wall flashings to allow inspection.

.2 Inspect with the Departmental Representative and examine thru-wall flashings and report in writing any defects in structure or differences from details. Inspection will review watertightness of membrane at thru-wall prior to installing siding material.

3.9 EXPOSED MEMBRANE ROOFING APPLICATION

.1 Insulation: fully adhered, bitumen application.
- .1 Embed insulation in 1 to 1.5 kg/m^2 mopping of bitumen.
- .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .3 Cut end pieces to suit.

.2 Tapered insulation application.
- .1 Mop insulation to vapour retarder and top layer of insulation to bottom layer with hot asphalt at rate of 1 kg/m^2.
- .2 Install tapered insulation as second layer in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.3 Fibreboard application.
- .1 Fully mop fibreboard, 12.5 mm thickness over fibreboard faced insulation or 25 mm thickness over paper faced insulation, with hot asphalt at rate of 1 kg/m^2.
- .2 Fibreboard joints to be staggered a minimum of 150 mm from insulation joints.
- .3 Butt fibreboard tight without gaps.

.4 Base sheet application.
- .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
- .2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, at 230°C. Keep asphalt back from outer edges of side and end laps to allow for torch sealing.
- .3 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps. Hold bitumen back 25mm ± from outer edge of side and end laps, lift and seal outer edge of lap with detail torch or hot air gun.
- .4 Application to be free of blisters, wrinkles and fishmouths.

.5 Cap sheet application.
- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
- .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
- .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
- .4 Application to be free of blisters, fishmouths and wrinkles.
- .5 Do membrane application in accordance with manufacturer's recommendations.

.6 Flashings.
- .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
- .2 Nail and torch flashing base sheet and torch flashing cap sheet onto substrate in 1 metre wide strips.
- .3 Lap flashing base sheet to membrane base sheet minimum 200 mm and seal by torch welding.
- .4 Lap flashing cap sheet to membrane cap sheet 150 mm minimum and torch weld.
- .5 Provide 75 mm minimum side lap and seal.

.6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.7 Do work in accordance with manufacturer's recommendations.

.7 Warning walkway:

.1 Heat surface of cap sheet and set granules using trowel.

.2 Torch apply walkway.

3.10 CANTS

.1 Install cants and fasten to vertical with 50 mm plate and fasteners spaced a minimum of 400 mm oc.

.2 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.

3.11 ROOF PENETRATIONS

.1 Install roof drains, vent stack flashing and other roof penetration flashings, whether supplied by this or other sections, and seal to membrane in accordance with the manufacturer's recommendations and details.

.2 Installation of cap to vent stack cover is to be done after vent stack insulation has been reviewed by the Departmental Representative.

.3 Insulate underside of drain body.

3.12 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 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry: Wood cants and curbs.

.2 Section 07 52 00 - Modified Bituminous Membrane Roofing.

.3 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

.1 ASTM International (ASTM).

- .1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A924/A924M-13, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .3 ASTM C920-14, Specification for Elastomeric Joint Sealants.
- .4 ASTM F1667-13, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- .5 ASTM D523-14, Test Method for Specular Gloss.
- .6 ASTM D2244-14, Standard Practice for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates.
- .7 ASTM D2247-11, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- .8 ASTM D2794-93(2010), Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- .9 ASTM D3359-09e2, Standard Test Methods for Measuring Adhesion by Tape Test.
- .10 ASTM D3363-05(2011)e2, Standard Test Method for Film Hardness by Pencil Test.
- .11 ASTM D4138-07a(2013), Standard Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means.
- .12 ASTM D4145-10, Standard Test Method for Coating Flexibility of Prepainted Sheet.
- .13 ASTM D4214-07, Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
- .14 ASTM D5402-06(2011), Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.

1.3 DEFINITIONS

.1 Custom colours: colours not normally produced by the industry and have not been assigned a colour number.

.2 Special colour range: colours produced by the industry that have been assigned a colour number; but, are more costly to produce than "standard colour range".

.3 Standard colour range: colours produced by the industry that are currently popular and/or cost effective, and have been assigned a colour number, and are available for the gauge specified. Colours may or may not be in stock by manufacturer.

.4 Stock colour range: colours in stock by an individual manufacturer for the gauge specified.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Submit duplicate 50 mm x 50 mm samples of each type of sheet metal material, colour and finish.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
- .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
- .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
- .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
  - .1 General maximum VOC 25g/L.
  - .2 Electrical apparatus components and electronic components.
  - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
- .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
- .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements.

.2 Prevent contact of dissimilar metals during storage, and protect from corrosive materials and elements.

2 Products

2.1 METAL MATERIALS

.1 Galvanized steel sheet: fabricated in accordance with ASTM A653/A653M, having a core of Grade 230 (33) steel; zinc-coated in accordance with ASTM A924/A924M to a Z275 designation; prefinished with polyester coating system.
.1 Thickness: 0.76 mm base thickness steel.

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB-37.5-M.

.3 Cleats/hook strip: of same material and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.4 Fasteners: to ASTM F1667, flat head roofing nails, of length and thickness suitable for flashing application; of same material as sheet metal.

.5 Washers: of same material as sheet metal, 1.6 mm with rubber packings.

.6 Exposed screws: zinc coated steel, head colour same as exterior sheet, dished steel/neoprene washer; 25 mm long.

.7 Sealant: silicone, to ASTM C920, Type S, Grade NS, uses NT, G, M, A and O.

2.3 FINISH

.1 Silicone modified polyester.
.1 Coating thickness: exposed surface 0.025 mm ± 0.002 mm; unexposed surface to have washcoat finish.
.2 Colour: as selected by Departmental Representative from custom range.
.3 Specular Gloss: to ASTM D523.
.1 20 to 80 at 60°.
.4 Pencil Hardness: to ASTM D3363.
.1 F to 2H.
.5 Formability: to ASTM D4145.
.1 2T to 4T3 with no loss of adhesion.
.6 Cross Hatch Adhesion: to ASTM D3359.
.1 No loss of adhesion.
.7 Reverse Impact: to ASTM D2794.
.1 No loss of adhesion.
.8 Humidity Resistance: to ASTM D2247.
.1 No field blisters @ 100% RH 1,000 Hours.
.9 Colour change: to ASTM D 2244.
.1 No more than 5ΔE Hunter units at 90˚ vertical angle and 7ΔE non vertical at 30 years.
.10 Chalk: to ASTM D4214.
.1 Rating no less that 8 at 90˚ angle and 6 at non vertical angle at 30 years.
.11 Dry Film Thickness: to ASTM D 4138.
.1 Top coat: 0.018 mm to 0.020 mm
.2 Primer: 0.005 mm to 0.007 mm

.3 Total system: 0.023 mm to 0.027 mm

.12 MEK Double Rubs: to ASTM D5402.

.1 150 Plus.

2.4 FABRICATION

.1 Fabricate metal flashings to profiles indicated.

.2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 13 mm. Miter and seal corners with sealant.

.4 Use flat lock seam joints, unless otherwise shown. Soldering will not be permitted.

.5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 EAVES TROUGH AND DOWNPIPES

.1 Eaves trough and down pipe: fabricated from prepainted galvanized sheet steel or prepainted sheet aluminum.

.1 Eaves trough: 125 mm K-style, complete with corners, ends and accessories.

.2 Downpipe: 100 mm diameter; compete with elbows and anchoring straps.

.3 Provide fasteners, straps, ferrules, and accessories required for complete installation.

.4 Provide leaf guard full length of eaves trough.

.2 Fasteners: non-ferrous, compatible with eave trough and down pipes.

2.6 SCUPPER

.1 Form scupper from stainless steel to profiles shown.

.2 Scupper to be of all welded, one-piece construction. Miter corners.

.3 Form flanges at head and jambs, and extend 50 mm onto parapet. Bottom flange to extend down cant and onto roof 100 mm.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install flashings as detailed.

.2 Coat flanges of flashing with asphalt primer before embedding into roofing.

.3 Nail gravel stop flashing at 150 mm o.c.; stagger nails.

.4 Use concealed fastenings except where approved before installation.

.5 Provide lock seam joints for all flashing at 2400 mm sections and lock seam slip joints every 4800 mm. Provide lock seam joints at exterior corners. Apply sealant to completely fill joints.

3.3 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm o.c. with eaves trough spikes through spacer ferrules or other attachment method acceptable to Departmental Representative. Slope eaves troughs to downpipes as indicated. Seal joints watertight.

.2 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm o.c.; minimum two straps per downpipe.

3.4 SCUPPERS

.1 Install scuppers as indicated.

3.5 ADJUST AND CLEAN

.1 Clean all flashing surfaces after installation. Do not use solvents detrimental to roofing membrane or roofing components.

.2 Remove all fasteners, metal clippings, etc., from roof surfaces and site.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.

1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .2 ASTM E119-12a, Test Methods for Fire Tests of Building Construction and Materials.
- .3 ASTM E605-93(2011), Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- .4 ASTM E736-00(2011), Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- .5 ASTM E759-92(2011), Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
- .6 ASTM E760-92(2011), Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
- .7 ASTM E761-92(2011), Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
- .8 ASTM E859-93(2011), Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
- .9 ASTM E937-93(2011), Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- .10 ASTM G21-13, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 Underwriters Laboratories of Canada (ULC).
- .1 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .3 CAN/ULC-S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Product data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Test Reports
- .1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
- .2 Submit test results in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
- .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.

.4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 - Field Quality Control.

1.4 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
.3 For products not identified on list, source products with highest recycled content available when practical.
.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.5 QUALITY ASSURANCE

.1 Qualification
.1 Fireproofing shall be applied only by applicators approved by fireproofing manufacturer.

.2 Mock-Up
.1 Construct mock-up in accordance with Section 01 10 01 - General Requirements.
.2 Apply fireproofing to approximately 10 m^2 area of surfaces of mock-up matching surface to be treated.
.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.
.2 Locate where directed.
.3 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with fireproofing work.

.4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
- .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
  - .1 General maximum VOC 25g/L.
  - .2 Electrical apparatus components and electronic components.
  - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
- .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
- .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
- .1 Store materials in dry location.
- .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .3 Damaged or opened containers will be rejected.
- .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
- .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
- .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.

1.8 AMBIENT CONDITIONS

.1 Ensure that a 5°C air and substrate temperature is maintained 24 hours before, during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.

.2 Maintain relative humidity within limits recommended by fireproofing manufacturer.

.3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.

.4 In enclosed areas lacking openings for natural ventilation, provide minimum of 4 air exchanges per hour by forced air circulation.

2 Products

2.1 MATERIALS

.1 Spray fireproofing: ULC certified, qualified for use in ULC Designs specified.

.2 Cementitious - Medium Density
- .1 Properties:
  - .1 Density (ASTM E605): 352 kg/m^3 nominal.
  - .2 Combustibility (CAN/ULC-S114): Passed, noncombustible
  - .3 Compressive Strength (ASTM E761): 813 kPa.
  - .4 Cohesion / Adhesion (ASTM E736): >19.1 KPa.
  - .5 Impact (ASTM E760): Passed.
  - .6 Deflection (ASTM E759): Passed.
  - .7 Corrosion of Steel (ASTM E937): Passed.
  - .8 Air Erosion (ASTM E859): 0.00 g/m^2.
  - .9 Surface Burning (ASTM E84):
    - .1 Flame Spread: 0,
    - .2 Smoke: 0
  - .10 Fungi Resistance (ASTM G21): Passed, no growth.

.3 Fireproofing material shall bear label of Underwriters' Laboratories verifying that materials conform to ASTM E119 and/or CAN/ULC-S101.

.4 Water: clean, potable and free of any deleterious substances which may affect the set of fireproofing.

.5 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.

.6 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.

3 Execution

3.1 PREPARATION

.1 Substrate shall be free of material, which would impair bond.

.2 Verify that painted substrate are compatible and have suitable bonding characteristics to receive fireproofing.

.3 Remove incompatible materials.

.4 Ensure that:
- .1 Clips, hangers, sleeves and similar devices have been attached.
- .2 Items required to penetrate fireproofing are placed.
- .3 Ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.2 QUALITY CONTROL

.1 Discard materials which have come into contact with water prior to actual use.

3.3 MINERAL FIBRE APPLICATION

.1 Cooperate in coordinating and scheduling of work.

.2 Apply bonding adhesive or primer to substrate as recommended by manufacturer.

.3 Apply sprayed mineral fibre in accordance with printed instructions to deck, joists and exposed steel of ceilings noted on drawings.

.4 Spray decks after concrete toppings have been installed.

.5 Wet all surfaces with water before application.

.6 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

.7 Apply fireproofing directly to open web joists without use of expanded mesh.

.8 Tamp smooth, surfaces visible in finished work.

.9 Apply sealer to surface of fireproofing according to coverage required by manufacturer.

.10 After fireproofing has been applied, pipes, ducts, studs, partitions and other equipment shall be installed as specified under appropriate sections.

.11 Apply fireproofing to columns, steel deck, joists and areas designated as having spray-on fireproofing.

.12 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide fire resistance rating to maintain required fire separation.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Part 1 - Submittals.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in Part 1 - Quality Assurance.

.2 Inspection and Site Tests:

.1 Inspection and testing of fireproofing will be carried out by Testing Laboratory designated by Departmental Representative.

3.5 PATCHING

.1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANUP

.1 Proceed in accordance with Section 01 10 01 - General Requirements.

.2 Clean all exposed finished walls and floor areas where fireproofing has been deposited in a manner which will not damage finished surface. Leave area in a broom-clean condition after completion of work.

.3 Remove rubbish of this trade from site.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 07 81 00 - Applied Fireproofing.

.2 Section 20 05 00 - Basic Mechanical Materials and Methods: Identification of mechanical service penetrations.

.3 Section 26 05 00 - Common Work Results Electrical: Identification of electrical service penetrations.

1.2 SUMMARY OF WORK

.1 This section shall provide firestopping and smoke seals at perimeter of fire-rated assemblies, at penetrations and openings through fire-rated assemblies, and around all services that penetrate fire-rated assemblies. Coordinate location, type and sizes of services penetrations with mechanical and electrical subtrades.

1.3 REFERENCES

.1 Underwriters Laboratories of Canada (ULC).
- .1 ULC S115-11, Standard Method of Fire Tests of Firestop Systems.

1.4 QUALITY ASSURANCE

.1 Provide manufacturer's direct representative (not distributor or agent) on site during initial installation of firestopping systems, to train personnel in proper selection and installation procedures.

.2 For firestopping applications where no ULC or cUL tested systems exist, submit manufacturer's engineering judgement derived from similar ULC or cUL system design or other tests to local authority having jurisdiction for their review and approval before installation.

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

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Shop Drawings
- .1 Submit ULC design system for each type of joint and service penetration.
  - .1 Show proposed material, fire rating, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
  - .2 Where more than one product is acceptable for a component, clearly indicate the product being supplied on this Project.
- .2 When no ULC or cUL system is available for an application, submit manufacturer's engineered judgement identification number and drawing details. Engineered judgement shall include both project name and contractor's name who will install firestopping system a described in drawing.

.3 Submit manufacturer's product data for materials and prefabricated devices. Include manufacturer's printed instructions for installation.

.3 Samples

.1 Submit duplicate 300 mm x 300 mm or 300 mm long samples, as applicable, of each type firestopping material.

1.6 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.

.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.

.1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.

.2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.

.3 For products not identified on list, source products with highest recycled content available when practical.

.4 Include following information with product data submission.

.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.

.1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.

.2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:

.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

2 Products

2.1 MATERIALS - GENERAL

.1 Fire stopping and smoke seal systems: in accordance with ULC S115.
- .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases, in compliance with requirements of ULC S115 and not to exceed opening sizes for which they are intended.
- .2 Firestopping system rating: not less than the fire-resistance rating of surrounding floor and wall assembly.

.2 Service penetration assemblies: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.

.3 Service penetration firestopping components: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.

2.2 FIRESTOPPING / SMOKE SEAL MATERIALS

.1 Mineral wool: ULC listed, semi-rigid, non-combustible, capable of being compressed 75% of original width; precut to required width and depth required, complete with impaling clips for use in horizontal fire separations; product as recommended by Firestopping manufacturer and listed in applicable ULC design.

.2 Firestopping sealant: ULC listed.
- .1 Silicone: one-part silicone based, non-sag or self-levelling for floor; movement capabilities minimum 25%.
- .2 Acrylic: one-part, water-based, flexible to accommodate movement.
- .3 Colour: firestopping sealant shall be only red.

.3 Cable management sleeve:
- .1 Re-penetrable type; smoke and gas tight assembly, consisting of wall sleeve, collars and hand operated mechanism to open/close smoke seal fabric membrane, thus permitting insertion/removal of cables from either side without jeopardizing integrity of fire separation.
- .2 Diameter of sleeve to accommodate current number of cables plus 100% more. If 100% more cables exceed sleeve capacity; provide additional sleeves necessary to accommodate extra quantity.

.4 Miscellaneous firestopping products:
- .1 Other products, such as mortar, fire blocks, collars, intumescent sealants and foams, may be used provided such products are ULC listed and are approved by Departmental Representative.
- .2 At combustible piping, in addition to firestopping sealant, provide intumescent tape and retaining collar.

.5 Primers: in accordance with manufacturer's recommendation for specific material, substrate, and end use.

.6 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.7 Damming and backup materials, supports and anchoring devices: to firestopping manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

3 Execution

3.1 PREPARATION

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

.2 Remove combustible materials and loose impediment from penetration opening and involved surfaces.

.3 Ensure that substrates and surfaces are clean, dry and free from oil, grease and other deleterious matter.

.4 Prepare surfaces in contact with fire stopping materials in accordance with manufacturer's instructions.

.5 Maintain insulation around pipes and ducts penetrating fire separation.

.6 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

.1 Install fire stopping material and components in accordance with ULC certification and manufacturer's instructions.

.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 a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSTALLATION LIMITATIONS

.1 When air or surface temperature is below 5°C, use silicone sealant only. Latex permitted only when temperatures are 5°C or above.

3.4 FIELD QUALITY CONTROL

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

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Part 1 - Submittals.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in Part 1 - Quality Assurance.

3.5 ADJUSTING AND CLEANING

.1 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application.

.2 Trim excess cured foam, if necessary, with a sharp knife or blade.

.3 Remove temporary dams after initial set of fire stopping materials.

3.6 SCHEDULE

.1 Firestopping and smoke seal at:

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

.2 Use cable management sleeve where communication cables (data, phone, radio) pass through fire/smoke separations.

.3 Maintain fire rating of assembly.

3.7 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of firestopping and smoke seal materials.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 08 50 00 - Aluminum Windows and Curtain Wall: Caulking of curtain wall.

1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM C881/C881M-13, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- .2 ASTM C920-14, Specification for Elastomeric Joint Sealants.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing.
- .2 CAN/CGSB-19.22-M89, Mildew-Resistant Sealing Compound for Tubs and Tiles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Manufacturer's product shall describe.
- .1 Required primers.
- .2 Sealing compound.

.3 Submit manufacturer's instructions for each product used.

1.4 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.
- .2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.
- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.5 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 10 01 - General Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of materials defined as hazardous or toxic waste in designated hazardous waste disposal site.

1.8 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 5°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.

1.9 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.

2 Products

2.1 SEALANT MATERIALS

.1 Sealants and caulking compounds shall:
- .1 meet or exceed all applicable governmental and industrial safety and performance standards; and
- .2 be manufactured and transported in such a manner that all steps of the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, by laws and regulations including, for facilities located in Canada, the fisheries Act and the Canadian Environmental Protection Act (CEPA).

.2 Sealant and caulking compounds must not be formulated or manufactured with: aromatic solvents, fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium or their compounds, except barium sulfate.

.3 Sealant and caulking compounds must contain total VOC content (volatile organic compounds) that do not exceed the requirements of the California South Coast Air Quality Management District (SCAQMD) Rule #1168.

.4 Sealant and caulking compounds must be accompanied by detailed instructions for proper application so as to minimize health concerns and maximize performance, and information describing proper disposal methods.

.5 In the selection of the products and materials of this section preference will be given to those with the following characteristics: Water based, water soluble, water clean-up, non-flammable, low Volatile Organic Compound (VOC) content, manufactured without compounds which contribute to ozone depletion in the upper atmosphere, manufactured without compounds which contribute to smog in the lower atmosphere, does not contain methylene chloride, does not contain chlorinated hydrocarbons.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Acrylics One-Part.
- .1 To CAN/CGSB 19-GP-5M.

.2 Silicones One-Part.
- .1 To CAN/CGSB 19.22 (Mildew resistant).

.3 Urethane, One-part
- .1 To ASTM C920, Type S, Grade NS, Class 25, Use NT, M, I class II, and O.

.4 Urethane, Two-Part.
- .1 Non-Sag to ASTM C920, Type M, Grade NS, Class 25.
- .2 Colour: as selected by Departmental Representative.

.5 Pick-proof sealant: ASTM C881/C881M, Type I and III, Grade 3.
.1 Two-component, non-sag, high-solids, high-modulus epoxy resin.
.1 Approved products (no substitutions): Dynapoxy EP-430 Fast by Precora, Dynapoxy EP-1200 by Pecora, AnchorFix 3011 by Sika Canada Inc.

.6 Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded closed cell foam backer rod.
.2 Size: oversize 30 to 50 %.
.2 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION AND COLOUR

.1 Exterior:
.1 Control joints in foundation walls: one-part urethane.
.2 Perimeters of exterior metal door openings where frames meet exterior facade of building: Sealant type: two-part urethane.
.3 Elsewhere between different materials: two-part urethane.
.4 Colour: to match adjacent materials.

.2 Interior:
.1 Interior perimeters of exterior openings:
.1 Sealant type - one-part acrylic.
.2 Perimeters of interior frames:
.1 Sealant type - one-part acrylic.
.3 Interior control joints (in masonry, concrete, gypsum board):
.1 Sealant type - one part acrylic.
.4 Joints between different materials:
.1 Sealant type: one-part acrylic.
.5 Perimeter of bath fixtures (e.g. sinks, tubs, waterclosets, basins, vanities):
.1 Sealant type - mildew-resistant silicone.
.2 Colour: to match fixture.
.6 Install pick-proof sealant where indicated on drawings.

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 PROTECTION

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

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant.
- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
- .1 Clean adjacent surfaces immediately and leave Work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

END OF SECTION