**Part 1 GENERAL**

1.1 RELATED WORK

.1 Section 01 47 15 – LEED Sustainable Requirements

.2 Section 07 25 00 – Air/vapour barriers

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB), latest edition.

.1 CAN/CGSB-37.2- M, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings

.2 CAN/CGSB 37.3- M, Application of Emulsified Asphalts for Dampproofing or Waterproofing

.3 CAN/CGSB 37.5- M, Cement, Plastic, Cutback Asphalt

.4 CGSB 37-GP-6Ma, Asphalt, Cutback, Unfilled, for Dampproofing

.5 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing

.6 CGSB 37-GP-11M, Application of Cutback Asphalt Plastic Cement

.7 CGSB 37-GP-12Ma, Application of Unfilled Cutback Asphalt for Dampproofing

.8 CGSB 37-GP-15M, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing

.9 CAN/CGSB 37.16, Filled, Cutback, Asphalt, for Dampproofing and Waterproofing

.10 CAN/CGSB 37.28, Reinforced, Mineral Colloid Type Emulsified, Asphalt for Roof Coatings and for Waterproofing

.11 CGSB 37-GP-36M, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing

.12 CGSB 37-GP-37M, Application of Hot Asphalt for Dampproofing or Waterproofing

.2 Canadian Standards Association (CSA), latest edition.

.1 CSA A123.4-M, Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems

1.3 SUBMITTALS

.1 All submittals shall be in accordance with Section 01 33 00, including proof of manufacturer's CCMC listing, shop drawings, product data, and manufacturer's instructions for special handling, installations, and maintenance procedures.

.2 Submit WHMIS MSDS - Material Safety Data Sheets for each product, primer, adhesives, etc., showing VOC levels. Products shall comply with Labour Canada & Health and Welfare Canada and VOC levels shall comply with LEED EQ credit 4.0, when located from the plane of the air barrier into the building.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 60 00 and manufacturer's instructions.

.2 Provide and maintain dry, off-ground weatherproof storage and store materials up on supports to prevent deformation.

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

1.5 QUALITY ASSURANCE

.1 Air/vapour barrier membrane and accessories shall be installed by a qualified contractor, specializing in performing the Work of this Section, and officially recognized as a Licensed Contractor by the National Air Barrier Association (NABA)

.2 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation; maintain one copy of documents on site.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse, and recycling in accordance with Section 01 74 21. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material, metal banding, etc. for recycling in accordance with Waste Management Plan.

.2 Remove from Site and dispose of packaging materials at appropriate recycling facilities. Ensure emptied containers are sealed and stored safely.

.3 Divert unused bituminous dampproofing, sealing compounds and asphalt primer materials from landfill to recycling facility complying with applicable regulations.

1.7 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

.1 Temperature, relative humidity, moisture content.

.1 Apply products 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 ºC for 24 hours before, during and 24 hours after installation.

.4 Do not apply products 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.

.3 Ventilate area of Work as recommended by manufacturer, as required by authorities, and ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.

1.8 EXTENDED WARRANTY

.1 The Contractor shall warrant Work of this Section against leakage for a period of two (2) years from the Date of Substantial Performance.

## Part 2 PRODUCTS

2.1 MATERIALS

.1 Waterproofing Membrane: Type 'A' self-adhering membrane of rubberized asphalt integrally bonded to polyethylene sheeting 1.5 mm thick; refer to Section 07 25 00.

.2 Primer: as recommended for each product by same manufacturer.

.3 Sealer: as recommended for each product by same manufacturer.

.4 Tape: two sided, reinforced sensitive tape or as recommended by same manufacturer

## Part 3 EXECUTION

3.1 INSTALLATION PROCEDURE

.1 Install material in accordance with manufacturer's instructions and as follows:

.1 Surface Preparation: smooth, monolithic concrete surfaces are required for proper membrane adhesion. Surfaces must be free of voids, spalled areas, loose aggregate, and sharp protrusions, with no coarse aggregate visible. Concrete must be cured (minimum 7 days) and dry before application of primer and membrane. Remove sharp protrusions and form match lines. Remove grease, oil or other contaminants. Clean surface with a broom, vacuum cleaner, or compressed air to remove dust, loose stones and debris.

.2 Priming: apply primer to all concrete or masonry with a lambswool roller at a coverage of 6 to 8 square meters per litre (250 to 350 sq.ft./gal). Allow primer to dry one hour or until tack free. Primer dries to a gray colour. Prime only the area which will be covered with membrane in a working day. Areas not covered with membrane in 24 hours must be reprimed. Dry primed surfaces should be covered immediately where contaminants from the air are accumulating on the surface. Metal or other dense surfaces do not require priming but must be clean, dry and free of loose paint, rust or other contaminants.

.3 Sealing edges: overlap all edge seams at least 63 mm, and end laps at least 150 mm. A guideline is printed on membrane for this purpose. Apply succeeding sheets with a minimum 63 mm overlap and roll entire membrane firmly and completely as soon as possible to minimize bubbles caused by outgassing of air or water vapour from concrete. For vertical applications, use heavy hand pressure. Patch misaligned or inadequately lapped seams with Bituthene membrane. Slit all fishmouths and overlap the flaps and repair with a patch, pressed or rolled to make the seal, and seal the edges with mastic.

.4 Sealing seams: overlap all edge seams at least 63 mm, and end laps at least 150mm. A guideline is printed on membrane for this purpose. Apply succeeding sheets with a minimum 63 mm overlap and roll entire membrane firmly and completely as soon as possible to minimize bubbles caused by outgassing of air or water vapour from concrete. For vertical application, use heavy hand pressure. Patch misaligned or inadequately lapped seams with Bituthene membrane. Slit all fishmouths and ovetrlap the flaps and repair with a patch, pressed or rolled to make the seal, and seal the edges with mastic.

.5 Corner details: double cover all inside and outside corners with an initial strip, a minimum of 300 mm wide, centered on axis of corner. This strip must be completely covered by regular application of membrane. Outside corners must

be free of sharp edges. Inspect surfaces adjacent to all corners and repair is necessary to provide a smooth dense surface.

3.2 PRECAUTIONS

.1 Vertical surfaces: on higher walls, apply in two or more sections with upper overlapping lower by at least 150mm. Completely press all membrane on vertical surfaces with heavy hand pressure during application.

.2 Exposed edges: if job must be left partially completed, roll the applied membrane and firmly seal outside edges with a trowelled bead of elastomeric mastic.

.3 Compatibility: material is incompatible with tars, pitches, certain liquid waterproofing products and sealants containing tar or polysulfide polymer. Avoid direct contact of the adhesive layer of membrane or elastomeric mastic with such systems.

.4 Safety: modified bituminous materials are flammable. Follow instructions on product labels.

3.3 SCHEDULE

.1 Apply a continuous, uniform coating typically to the entire exterior face of all foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings, unless indicated otherwise.

.2 Apply a continuous layer to the exterior side of foundation walls, enclosing spaces below finished grade. Include outer face of interior foundation walls where floor levels in adjacent spaces are at different elevations.

.3 Apply additional layers of waterproofing 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.

.4 Where foundation shoring is required, apply waterproofing to inside face of rigid foundation insulation instead before placement.

**END OF SECTION**

## Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 07 25 00 - Vapour and Air Barriers

.2 Section 07 53 50 – Modified Bituminous Membrane Roofing

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM), latest edition.

.1 ASTM E96, Test Methods for Water Vapor Transmission of Materials

.2 ASTM C208, Standard Specification for Cellulosic Fiber Insulating Board

.3 ASTM C591, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

.4 ASTM C726, Standard Specification for Mineral Fiber Roof Insulation Board

.5 ASTM C728, Standard Specification for Perlite Thermal Insulation Board

.6 ASTM C1126, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation

.7 ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

.3 Canadian Gas Association (CGA), latest edition

.1 CAN/CGA-B149.1-M, Natural Gas Installation Code

.2 CAN/CGA-B149.2, Propane Installation Code

.4 Canadian General Standards Board (CGSB), latest edition

.1 CGSB 71-GP-24M, Adhesive, Flexible, for Bonding Cellular polystyrene Insulation

.5 Underwriters Laboratories of Canada (ULC), latest edition.

.1 CAN/ULC-S701, Thermal Insulation, Polystrene, Boards and Pipe Coverings

.2 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

**Part 2 PRODUCTS**

2.1 INSULATION

| Properties | | CND Standard TYPE (CAN/ULC S701) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1<br>EPS | 2<br>EPS or XPS | 3<br>XPS | 4<br>XPS | 4A<br>XPS | 4B<br>XPS | 4C<br>XPS | 5 | 6<br>Polyiso |
| Moisture Absorption Maximum (% by Volume) | ≤6% | ≤4% | ≤0.7% | ≤0.7% | ≤0.7% | ≤0.7% | ≤0.7% | ≤0.07% | ≤1.0% |
| Compressive Strength Minimum in psi (kPa) | ≥10 (70) | ≥16 (110) | ≥20 (140) | ≥30 (210) | ≥40 (276) | ≥60 (414) | ≥100 (690) | - | ≥20 (140) |
| Flexural Strength Minimum in psi (kPa) | ≥24.6 (170) | ≥34.8 (240) | ≥43.5 (300) | ≥50 (345) | ≥50 (345) | ≥50 (345) | ≥50 (345) | - | - |
| R/Inch approx. | ≥3.7 (0.65) | ≥4 (0.7) | ≥4.2 (0.74) | ≥4.88 (0.86) | ≥4.88 (0.86) | ≥4.88 (0.86) | ≥4.88 (0.86) | ≥4.2 (0.74) | ≥5.7 (1.0) |
| Standard of Acceptance | Plastispan | Wallmate (R5)<br>Deckmate (R5)<br>Foamular 350<br>Plastispan HD<br>Tapered:<br>Deckmate Plus, Foamular Thermapink 25, PlastiSpan HD | CM 20<br>Styrospan<br>Cavitymate<br>Cavitymate Ultra (R5.6)<br>Foamular C-200 | Styrofoam SM<br>Roofmate<br>Roofmate CT<br>Foamular C-300 Or C-350<br>TC CTI<br>TC SRI | HI 40<br>Foamular 400 | HI 60<br>Foamular 600 | HI 100<br>Foamular 1000 | Roxul Cavity Rock (R4.2)<br>Roxul Curtain Rock (R4.2)<br>Fibrex FBX 1240 | Sopra-Iso (roof)<br>Sopra-Iso Plus (top layer @ cold-applied roof)<br>IKOTherm (torch-on roof)<br>IKOTherm III (roof)<br>IKO Enerfoil (wall)<br>JM AP Foil-Faced (wall) |

.1 All products shall meet the recycled content criteria in Section 01 47 15.

.2 Tapered/sloped rigid roof insulation to CGSB 51-GP-20M: Type 2 closed cell, expanded or extruded foam polystyrene board. Min. R-value of 4.04/inch and min. compressive value 16 psi. Acceptable products: Plasti-Fab Plastispan HD, Dow Deckmate Plus, or Owens Corning Thermapink 25. Also refer to Section 07 53 50.

2.2 SEMI-RIGID ROCK WOOL FIBRE INSULATION BOARD

.1 Type 5, from rock and slag, non-combustible, lightweight, and water repellant with 0 flame spread rating and rigid upper surface. For exterior wall/parapet locations, exterior walls with fire resistance ratings, and where indicated on drawings. Roxul, or Fibrex (see chart above).

2.3 ADHESIVE (FOR POLYSTYRENE)

.1 Adhesive: to CGSB 71-GP-24, Bulldog Wetstick/Bulldog Grip PL 200.

2.4 ACCESSORIES

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

.2 Insulation ties below structural floor slabs: impale type, rigid plastic or other durable material, with self-locking directional ribs and of sufficient length to penetrate into insulation at least half the thickness plus a 50 (2") long stem for anchoring into concrete.

**Part 3 EXECUTION**

3.1 EXAMINATION

.1 Examine substrates and immediately inform Contract Administrator of defects in writing.

.2 Prior to commencement of work, ensure that substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.2 WORKMANSHIP

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

.2 Fit insulation tight around electrical boxes, pipes, ducts and other penetrations, and around exterior doors, windows, and other openings.

.3 Keep insulation a minimum of 75mm away from heat emitting devices such as recessed light fixtures and a minimum of 50mm away from the sidewalls of CAN4-S604, Type 'A' chimneys, and as required by code, whichever is more restrictive.

.6 Cut and trim insulation neatly to fit all spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.7 Offset both vertical and horizontal joints in multiple layer applications.

.8 In concealed spaces, do not cover insulation until it has been observed by the Contract Administrator and the authority having jurisdiction.

3.3 GENERAL INSTALLATION

.1 Install insulation boards at all areas as noted and indicated on drawings, including the full exterior face of foundation walls/grade beams. Secure insulation boards to foundation with mechanical fasteners or adhesive, as recommended by manufacturer.

.2 Where foundation shoring is required, secure insulation boards to back of shoring forms.

.3 Leave insulation board joints unbonded over expansion and control joints. Instead, bond

a continuous 150 (6”) wide strip of 0.15 mm polyethylene over expansion and control joints, using compatible adhesives before application of insulation.

.4 Where two layers of insulation boards are noted, typically stagger each layer perpendicular to the other, and stagger joints between layers typically at least 150 (6”).

.5 At joints between rigid insulation boards and at other small voids, fill gaps with closed cell spray foam insulation to achieve a continuous insulated surface.

.6 Coordinate work of this Section related to Roofing Sections. Unless otherwise noted, install the tapered insulation as the first layer, in accordance with shop drawings.

**END OF SECTION**

## PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 07 25 00 - Vapour and Air Barriers

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM), latest edition.

.1 ASTM C 665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

.2 ASTM C 1320, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction

.2 Canadian Standards Association (CSA), latest edition

.1 CSA B111, Wire Nails, Spikes and Staples

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

## PART 2 PRODUCTS

2.1 INSULATION

.1 Batt and blanket mineral fibre to ASTM C665, ASTM E136, and CAN/ULC S702, Type 1, unfaced, (CFC and formaldehyde free) with recycled content (Section 01 47 15 LEED SUSTAINABLE REQUIREMENTS), and to R-value, thickness and locations as indicated on the drawings:

.1 Batt insulation in interior walls for thermal and acoustic purposes: Johns Manville ‘Formaldehyde-Free Insulation’, CertainTeed ‘Sustainable Insulation’, or Owens Corning ‘EcoTouch’.

.2 Mineral wool batt insulation, processed from rock or slag, in fire-rated stud walls and other fire-rated locations: Roxul. Refer to ULC design listings for material of batt insulation required.

.3 Mineral wool batt insulation for acoustic purposes, in stud walls or loosely laid directly above suspended acoustic t-bar ceilings to a 150 (5.5”) thickness, or as otherwise noted: Roxul AFB.

.4 Semi-rigid mineral wool batt insulation: refer to Section 07 21 13.

2.2 ACCESSORIES

.1 Insulation clips where indicated:

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

.2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.

.3 Staples: 12 mm minimum leg.

.4 Tape: as recommended by manufacturer.

## PART 3 EXECUTION

3.1 INSULATION INSTALLATION

.1 Install insulation to achieve and maintain a continuous thermal, acoustic, and/or fire protection to and between building elements and spaces, as required and as indicated on the drawings.

.2 Fit insulation snugly around electrical boxes, pipes, ducts, frames, and other objects, that pass through or penetrate the insulation.

.3 Fit insulation carefully into and between other elements, but do NOT compress insulation to fit into spaces.

.4 Keep insulation a minimum of 75mm (3”) away from heat emitting devices such as recessed light fixtures, and a minimum of 50mm (2”) away from CAN/ULC-S604, Type “A “chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.

.5 In sound rated walls, install acoustic batt material snugly around all penetrations and achieve continuous coverage between elements, to maintain a highly efficient acoustic separation.

.6 In concealed spaces, do not cover over any insulation material, before it has been observed by the Contract Administrator and any authorities having jurisdiction.

**END OF SECTION**

## Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Sprayed insulation at exterior walls, at junctions of dissimilar wall and roof materials, and where indicated on the drawings, in order to help achieve a continuous thermal building envelope and seal.

1.2 RELATED SECTIONS

.1 Section 01 47 15 – Sustainable Requirements

.2 Section 05 41 00 – Structural Metal Stud Framing

.3 Section 06 10 00 – Rough Carpentry

.4 Section 07 25 00 – Vapour and Air Barriers

1.3 REFERENCES (latest editions)

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada (latest version)

.2 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.3 Green Seal Environmental Standards

.1 Standard GC-03, Anti-Corrosive Paints

.2 Standard GS-11, Architectural Paints

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS)

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-, Architectural Coatings

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.

.2 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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

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

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit manufacturer's printed product literature, specifications, and data sheets, including product characteristics, performance criteria, physical size, finish, and limitations.

.3 Submit two copies WHMIS MSDS – Material Safety Data Sheets.

.4 Sustainable Design Submittals: refer to Section 01 47 15.

.5 Quality Assurance Submittals shall include:

.1 Certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties. Test reports shall be in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.2 Manufacturer's installation instructions, special handling criteria, installation sequence, and cleaning procedures.

1.5 QUALITY ASSURANCE

.1 Applicators to conform to CUFCA Quality Assurance Program.

.2 Qualifications:

.1 Installer: person specializing in sprayed insulation installations with minimum 5 years experience and approved by the manufacturer.

.2 Manufacturer: company with minimum 5 years experience in producing material used for work of this Section, with sufficient production capacity to produce and deliver required units without causing delay in work.

.3 Mock-up:

.1 Construct mock-up in accordance with Section 01 45 00. Provide an on-site area of 10$m^2$ of sprayed insulation including one inside corner and one outside corner. Upon approval by Contract Administrator, mock-up may be part of the finished work.

.2 Allow minimum 24 hours notice to Contract Administrator for inspection of mock-up, before proceeding with rest of work of this Section.

.4 Health and Safety Requirements (worker protection):

.1 Protect workers according to CAN/ULC-S705.2 and manufacturer's recommendations.

.2 Workers must wear required protective apparel and must not eat, drink or smoke while applying foam insulation.

.5 Pre-installation Meeting: Coordinate this meeting to coincide with a regular site meeting for all involved parties, at least one week before starting work of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling, and unloading: Deliver, store, and handle materials in accordance with Section 01 60 00 and in accordance with manufacturer's written instructions.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21. Collect and separate all packaging material in appropriate on-site bins, for recycling and for disposal, in accordance with Waste Management Plan.

.2 Remove from the Site and dispose of all packaging materials at appropriate recycling facilities.

.3 Dispose of waste product daily in locations designated by the Contract Administrator and decontaminate empty drums in accordance with foam manufacturer's instructions to CAN/ULC-S705.2. Divert metal drums from landfill to metal recycling facility as approved by Contract Administrator and to CAN/ULC-S705.2.

1.8 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.

.2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and for 24 hours after application, to maintain non-toxic, unpolluted, safe working conditions.

.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

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

.5 Apply insulation only when surfaces and ambient temperatures are within manufacturer's prescribed limits.

**Part 2 PRODUCTS**

2.1 MATERIALS

.1 Spray applied medium density foam above grade: two-component isocyanate and polyurethane, site-mixed and spray applied to act as an air barrier system and a vapour barrier system to meet MBC (latest edition), CAN/ULC-S705.1, and CCMC 13244-L. Final density to be minimum 31.3 kg/m3 (2 lbs/ft3) and a minimum thermal resistance of RSI 1.06/25mm (R6 per inch). 90% minimum closed cell content, 500 maximum flame spread rating, and VOC level to comply with LEED requirements. Acceptable products: Airmetic SOYA/Heatlok SOYA by Demilec Inc., Polarfoam SOYA by PSFI, Foamsulate by Premium Spray Products Canada, MD-C-200-V2 by Icynene Inc., or Walltite Eco V.3 by BASF.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

## Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage, installation instructions, and data sheets.

3.2 APPLICATION

.1 Inspect substrates carefully to ensure that all openings and penetrations have adjacent air/vapour barriers material in place and overlapped (Section 07 25 00 and others), and that the substrate is ready to receive work of this Section.

.2 Spray apply insulation to clean, dry surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.

.3 Only use products that have not passed the expiry date printed on the label.

.4 Refer to drawings and details for locations and for desired thicknesses and R-values. Apply insulation to entirely cover the surface of the area to be insulated and in passes of between 15mm (5/8") and 50mm (2") thick.

.5 Generally apply this insulation to achieve a continuous, even thickness over the entire surface area to be insulation, and without gaps to adjacent air/vapour barriers and to adjacent insulation of other Sections.

.6 Keep this product spaced away from heat emitting devices such as recessed light fixtures, chimneys, and as required by related regulations or by the manufacturer's instructions.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.2 On completion and verification of performance of the Work, remove surplus materials, excess materials, rubbish, tools, and equipment.

**END OF SECTION**

## PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Supply and installation of air/vapour barrier materials, products, and assemblies, resulting in a continuous building envelope and a continuous seal at all building penetrations.

1.2 RELATED WORK

.1 Section 01 47 15 – LEED Sustainable Requirements

.2 Section 01 81 00 – Building Envelope Commissioning

.3 Section 07 11 13 – Sheet Waterproofing

.4 Section 07 21 13 – Board Insulation

.5 Section 07 53 50 – Modified Bituminous Membrane Roofing

.6 Section 07 92 00 - Joint Sealants

.7 Section 09 29 00 – Gypsum Board

1.3 REFERENCES

.1 Canadian Construction Association – latest edition

.1 CCA 5, Construction Management Contract.

.2 Canadian General Standards Board (CGSB) – latest edition

.1 CAN/CGSB-19.13M-M, Sealing Compound, One Component, Elastomeric Chemical Curing

.2 CAN/CGSB-19.18M-M, Sealing Compound, One Component, Silicone Base Solvent Curing

.3 CAN/CGSB-19.24M-M, Multi-Component, Chemical Curing Sealing Compound.

.4 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.3 Building Code (latest edition), Part 5 - Environmental Separation.

.4 Sealant and Waterproofer's Institute, Sealant and Caulking Guide Specification, latest.

.5 CSA S478- “Guideline on Durability in Buildings”

.6 Canadian Construction Materials Centre (CCMC), technical Guide for Air Barrier Systems for Exterior Walls of Low-Rise Buildings

1.4 QUALITY ASSURANCE

.1 Air/vapour barrier membrane and accessories shall be installed by qualified Contractors, who specialize in Work of this Section, and who are certified by a recognized association.

.2 Contractors shall perform Work in accordance with the Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation. Keep one copy of this document on site.

1.5 PRE-INSTALLATION MEETING

.1 A pre-installation meeting between the Contractor, Air Barrier Subcontractors, Contract Administrator, Manufacturer's representative, and any other trades/suppliers related to the installation of the air barrier membrane system, will be held with all in attendance.

.2 At this meeting, the following will be covered:

.1 Submittals and documentation

.2 Installation and performance requirements

.3 Mock-ups

.4 Testing and inspection schedules

.5 Protection of Work

1.6 MOCK-UPS

.1 Do mock-ups in accordance with Section 01 33 00 – Submittals. Construct mock-up of air/vapour barrier installation including typical exterior wall (1.5 x 1.5m panel), window frame, jamb and sill, insulation, building corner condition, and junction with roof vapour retarder, illustrating materials interface and seals.

.2 Mock-up may be part of finished Work, only if reviewed and accepted by the Contract Administrator. Allow 48 hours notice minimum for inspection of mock-up by Contract Administrator before proceeding with Work.

1.7 FIELD TESTING

.1 Inspection, testing, and written reports of air/vapour barrier membrane application and mock-ups will be carried out by an independent inspection agency hired by the The City. Also refer to Section 01 81 00.

.2 The Contractor shall notify this agency 48 hours minimum, prior to commencement of air/vapour barrier membrane application, and arrange for an inspection. The Contractor shall allow full access to all portions of the Work.

.3 When necessary, the Work may be inspected periodically by the manufacturer's representative, to ensure compliance with the manufacturer's specifications.

.4 Membranes shall be fully adhered to substrates and shall be capable of withstanding a pull test of 192 lbs over a 12 sq in test area, in accordance with ASTM D4541, "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers".

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver all air/vapour barrier membrane and accessory materials to the Site in original and un-opened packaging with the manufacturer's label intact, including name of contents and product code, net weight of contents, lot or batch number, storage temperature limits, shelf life expiration date, and safety information and instructions.

.2 Provide raised platforms, waterproof coverings and interior storage as necessary to protect materials from direct sunlight, chemicals, solvents, precipitation, ground moisture and temperature extremes, as per manufacturer's recommendations.

.3 Do not double stack pallets of air/vapour barrier membrane. Protect rolls from direct sunlight until ready for use.

.4 Adhesives and primers contains solvents and are flammable. Do not store or use near open flame or spark.

1.9 SUBMITTALS

.1 All submittals shall be in accordance with Section 01 33 00, including proof of manufacturer's CCMC listing, shop drawings, product data, and manufacturer's written instructions for handling, installation, and maintenance procedures. Copies of these shall be kept on-site during air barrier installation for reference.

.2 Submit WHMIS MSDS - Material Safety Data Sheets for each product, primer, adhesives, etc., showing VOC levels. Products shall comply with Labour Canada & Health and Welfare Canada and VOC levels shall comply with LEED EQ credit 4.0, when located from the plane of the air barrier into the building.

.3 Contractors shall submit a copy of their training certification from each major product manufacturer being used.

1.10 ENVIRONMENTAL REQUIRMENTS

.1 Except as explicitly permitted by the materials manufacturer, no installation Work shall be performed on walls exposed to inclement weather or on frost covered or et surfaces.

.2 Substrate shall be protected from exposure to moisture following application, until building envelope is complete.

.3 Do not install solvent curing sealants or vapour release adhesive materials in enclosed spaces without ventilation.

.4 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.5 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

.6 Concrete block assemblies shall be cured a minimum of seven (7) days and be free of surface moisture. Allow a minimum of 24 hours drying period following precipitation.

.7 Prior to installation, inspect those areas to receive the air/vapour barrier membrane to ensure that they are clean, dry, sound, smooth and continuous.

.8 Do not commence air/vapour barrier membrane installation until roofing has been installed, including over parapets.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21.

.2 Remove from Site and dispose of all packaging materials at appropriate recycling facilities. Collect and separate for disposal all packaging material, in appropriate on site bins, for recycling in accordance with Waste Management Plan.

1.14 SEQUENCING/SCHEDULING

.1 Work shall be scheduled to provide an airtight seal at the end of each working day on the area worked upon during the day.

.2 Sequence Work to permit installation of materials in conjunction with related materials and seals.

1.15 WARRANTY

.1 Provide a written installer's warranty against any defects in barrier materials, workmanship, and installation, for three (3) years from Date of Substantial Performance. Include any materials which fail to achieve the required air tightness and water tightness seal, and/or which exhibit a loss of adhesion or cohesion, or do not cure.

1.16 DURABILITY

.1 Product manufacturers shall certify their products will meet all characteristics required by CSA S478.

## PART 2 PRODUCTS

2.1 SHEET MATERIALS

| Type | Application | Accepted Material (or approved equal) |
|---|---|---|
| A | Below Grade: Peel and stick air/vapour barrier for foundation dampproofing and stripping flashing | Grace 'Bituthene 3000/LT', Soprema 'Colphene 3000', Henry 'Blueskin WP 200', IKO 'Aquabarrier FP', Carlisle 'CCW MiraDRI 860-861', W.R. Meadows 'Mel-Rol/LT. |
| B | Moisture protection at eaves and valleys on a sloped roof: Peel and stick type, modified bituminous, rubberized asphalt, self-adhering | Grace 'Ice and Water Shield', Soprema Sopraseal Stick 1100T', IKO 'Stormshield Ice and Water Protector, BP 'GripGard', Convoy Leak Protector, Resisto LB1236. |
| C | Above grade: Thermo-fusible torch-applied air/vapour barrier on concrete/masonry substrates or where installation temperatures will be below –12 degrees C: | Henry 'Blueskin TG', Soprema 'Sopraseal 60 or Sopraseal 180', IKO 'Aquabarrier TG' |
| D | Above grade: Peel and stick air/vapour barrier where installation temperatures are above that recommended by the manufacturer: | Bakor 'Blueskin SA or Blueskin SALT', Soprema 'Sopraseal Stick 1100T', Grace 'Perma Barrier', IKO 'Aquabarrier AVB', Carlisle 'CCW 705LT'. |

| | | |
|---|---|---|
| E | Below grade: under Basement and structural slabs | 10 mil poly vapour barrier; (CAN CG SB 51.34-M). |
| F | Above grade: Exterior wall and ceiling surfaces: | 6 mil poly vapour barrier, CMHC approved; (to CAN/CGSB 51.34-M). |
| G | Above grade: Exterior wall surface sheet air barrier: | Dupont 'Tyvek HomeWrap', 'Typar HouseWrap', Cosella-Dorken 'Delta-Vent S', 'Air-Gard Ultra/BP Air Lock', Isolofoam 'Isoclad' |
| H | Full self-adhesive air barrier underlayment under sloped metal roof: | Henry 'Blueskin VP100' or 'Blueskin VP160', Cosella-Dorken 'Delta-Vent SA' |
| J | Full underlayment under sloped shingle roof (3:12 slope or >): | Grace 'Tri-Flex Xtreme', BP 'DeckGard', GAF Deck-Armor, InterWrap 'Titanium UDL25' |
| K | Below grade, at crawlspace and void space areas: | 15 mil (0.5mm) high strength, durable vapour barrier, Stego Wrap Vapour Barrier by Stego Industries |
| L | Above grade: self-adhesive air barrier for wood substrates where open flame cannot be used, and where installation temperatures are above that recommended by the manufacturer: | Henry 'Blueskin VP100', 'Blueskin VP160', Cosella-Dorken 'Delta-Vent SA' |
| T | Roof thermo-fusible torch-applied Vapour barrier membrane of glass grid reinforcement and SBS modified bitumen on non-combustible substrates. | Sopraseal 60F/F 2.7mm thick. |
| U | Self-adhesive air/vapour barrier at flat roof: | Soprema 'Sopavap'r', IKO 'AquaBarrier AVB', Henry 'Vapor-Block SA' |

.3 ADHESIVES

.1 Mastic adhesive, primers, sealants: Compatible with sheet membrane and substrate, and of uniform thickness as recommended by manufacturer.

.2 Sealants to be neutral cure silicone type as specified in Section 07 92 00.

2.4 ACCESSORIES

.1 Thinner and cleaner for Butyl or Neoprene Sheet: As recommended by sheet material manufacturer. Non-staining type.

.2 Joint Cleaner: Non-corrosive and non-staining type; recommended be sealant manufacturer; compatible with joint forming materials.

.3 Joint/sheathing tape for Type 'E', 'F', or 'G' air barriers: 3M brand Y-8086 Contractor Sheathing Tape, Tuck 20502 Contractor Sheathing Tape.

.4 Rubberized flashing membrane for Type 'C' & 'D' membranes: to be compatible with adjacent surfaces and from the same manufacturer as the air/vapour barrier.

.5 Self adhesive butyl tape to seal the shim space between window frames and rough opening substrates: to be compatible with adjacent surfaces, have a low VOC rating, double-sided seal, heat and cold resistant, and thick enough to be used as a shim.

.6 Low-expansion closed-cell spray foam for smaller gaps and cracks: to be compatible with adjacent surfaces with a low VOC rating.

.7 Thermal break material for structural steel connections: of reinforced, thermoset resin, fire resistant with max. operating temperature of 220 deg. F , very limited creep under load, and thermal washers and bushings. Maximum loading pressure of 45,000 psi. Standard thicknesses of 13 (1/2"), 19 (34"), 25 (1"), & 50 (2"). Acceptable product: 'Armatherm Grade FRR' by Armadillo Structural Connections (tel. 1.800.580.3984). Refer to details and drawings for locations.

## Part 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 barrier manufacturer's requirements.

.3 Report any unsatisfactory conditions to the Contract Administrator in writing.

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

3.2 PREPARATION

.1 Ensure all substrates are clean, all joints struck flush, open joints filled, and all concrete surfaces are free of large voids, spalled areas, or sharp protrusions. Remove loose or foreign matter, which might impair adhesion of materials. Ensure metal closures are free of sharp edges and burrs.

.2 Ensure all substrates are free of surface moisture before application of self-adhesive membrane and primer. Prime substrate surfaces to receive adhesive and sealants, in accordance with manufacturer's instructions.

3.3 INSTALLATION

.1 Install air/vapour barrier products in accordance with the manufacturer's instructions, as indicated on the drawings and details, and to provide a continuous building envelope.

.2 Apply adhesives, primers, and sealants within recommended application temperature ranges. Consult manufacturer when product cannot be applied within these ranges.

.3 Where Types ‘E’, ‘F’, and ‘G’ air/vapour barriers occur, apply sheathing tape at all fasteners, joints, all seams around openings and penetrations, to maintain a continuous building envelope, and as recommended by the manufacturer. Extend tape at least 200 (8”) beyond the opening typically. Apply at sill joints first, then jamb joints, and then head joints, to create a natural drainage plane downward.

.4 Where Types ‘C’ and ‘D’ air/vapour barriers occur, apply rubberized flashing membrane at all seams around openings and penetrations to maintain a continuous building envelope, and as recommended by the manufacturer. Extend flashing at least 200 (8”) beyond the opening typically. Apply at sill joints first, then jamb joints, and then head joints, to create a natural drainage plane downward.

.5 At window openings, typically apply a thickness of butyl tape to the back side of the frame to completely fill the shim space between the frame and the rough opening. Apply low expansion spray foam to fill any portion of the shim space remaining.

.6 Do not enclose any Work of this Section until it has been observed and reviewed by the Contract Administrator and any applicable authorities.

3.4 PROTECTION OF WORK

.1 Protect finished Work in accordance with Section 01 60 00. Do not permit adjacent Work to damage work of this section.

.3 Ensure finished Work is protected from climatic conditions.

**END OF SECTION**

## Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures
.2 Section 04 22 00 – Concrete Masonry Units
.3 Section 05 41 00 – Structural Steel Stud Framing
.4 Section 07 61 20 – Prefinished Metal Roofing
.5 Section 07 62 00 – Sheet Metal Flashing and Trim
.6 Section 07 92 00 – Joint Sealants

1.2 SUBMITTALS

.1 All submittals shall comply with Section 01 33 00.
.2 Shop drawings shall indicate panel dimensions, gauges, layout, general construction details, overlaps, fasteners, joinery, sealing methods, thermal movement details, accessories, and method of installation.
.3 Upon request, submit samples to comply with Section 01 33 00.

1.3 QUALITY ASSURANCE

.1 Panel system installer shall be experienced with installation of metal wall and roof panels, on projects of similar scope and complexity.

1.4 DELIVERY, HANDLING, AND STORAGE

.1 Store and protect panels in strict accordance with manufacturer's recommendations.
.2 Maintain in original packaging until ready for installation.

1.5 WARRANTY

.1 Provide a written manufacturer's warranty that the finish will not crack, flake, peel, or lose adhesion, for thirty-five (35) years from the date of Shipment. Chalking and fade rating will not exceed manufacturer's guidelines for thirty (30) years from the date of shipment.

.2 Provide a written installer's warranty against any defects in labour and workmanship, for one (1) year from the Date of Substantial Performance.

## Part 2 PRODUCTS

2.1 MATERIALS

.1 Panel cladding system shall be of such profile and gauge to withstand any load requirements noted on the drawings, with a deflection limit of L/60 for aluminum and L/180 for steel.
.2 Wall Cladding: Fabricated from Z275 galvanized sheet steel conforming to ASTM A653M Grade 230 and ASTM A792M Grade 230. 0.61mm (24 gauge) core steel thickness. Acceptable products: Vic West 'AD150' or Agway Metals 'HF-6 NF'. One colour to be selected by Contract Administrator from full standard range available. Refer to drawings for locations.
.3 Sub-girts, clips, spacers: minimum 1.21 mm (0.048") thick formed galvanized steel, ASTM A653M Grade 230 with Z275 zinc coating. Full depth of wall system or as detailed on drawings, factory notched and formed to suit cladding profiles.
.4 Flashings and Closures: fabricated from same metal, gauge, colour, and finish as panels, unless otherwise detailed on drawings. Profile closure strips to be fabricated from metal or synthetic rubber.

.5 Finish: shall be 10,000 series typically; high performance, exterior quality, Polyvinylidene Fluoride (PVDF) comprised of 70% Kynar 500 or Hylar 5000.

2.2 ACCESSORIES

.1 Fasteners: All exposed fasteners to be self-tapping, with a fiberglass reinforced nylon head, and a corrosion-resistant finish to match the prefinished cladding colour. Include soft neoprene washers.
.2 Air/vapour barriers behind cladding system: refer to Section 07 25 00.
.3 Sealants: Use only manufacturer's recommended type; non-staining; non-corrosive; non-shrinking and non-sagging, ultra-violet and ozone resistant for exterior applications. Colour to match cladding. See Section 07 92 00.

2.3 COMPONENT FABRICATION

.1 Cladding panels: widths and lengths to suit application; lapped edges to be fitted with continuous length sealant or gaskets.
.2 Internal and External Corners: of same material and colour as cladding; brake formed. Pop rivets to be stainless steel.
.3 Flashings, Closures & Trim Pieces: brake form to required profiles.

## Part 3 EXECUTION

3.1 INSTALLATION

.1 Site verify that structural substrate is level or plumb, sound, clean, dry, free of any defects, and ready for Work of this Section.
.2 Beginning of Work means acceptance of structural substrate conditions.
.3 Install sub-girts, clips, spacers, all necessary reinforcements and prefinished metal cladding system, in strict accordance with reviewed shop drawings, and the manufacturer's recommendations/installation instructions.
.4 Metal panels shall be erected level and plumb, in proper alignment and relation to structural substrate and true to established lines. Maximum offset from true alignment between adjacent members to be 2mm. Maximum variations from plane or location indicated on drawings to be 3mm (1/8”).
.5 Exercise care when cutting cladding on-site, to ensure that cuttings are removed from finish surfaces. All cuts to be cleaned with cut edge filed smooth or hand trimmed.
.6 Protect cladding surfaces in contact with cementitious materials and other dissimilar metals with bituminous paint. Allow protective coating to dry prior to installing members.
.7 Locate end laps over supported substrate. End lap panels to be minimum 50 mm. Side laps shall be over firm bearing.
.8 Provide expansion joints where indicated on drawings and where required.
.9 Use concealed fasteners where possible; exposed fasteners in all other locations.
.10 Install sealant where required to stop direct weather penetration.
.11 Complete installation shall be free of rattles, noise due to thermal movement, and wind whistles.

3.2 ADJUSTING AND CLEANING

.1 Replace any panels that have irreparable damage. Repair any panels with minor damage.
.2 Clean any foreign material off panel finishes.

**END OF SECTION**

**Part 1 - GENERAL**

1.1. RELATED WORK

.1 Section 01 47 15 – LEED Sustainable Requirements
.2 Section 01 74 21 - Construction/Demolition Waste Management
.3 Section 06 10 00 – Rough Carpentry
.4 Section 07 21 13 – Board Insulation
.5 Section 07 25 00 – Air and Vapour Barriers
.6 Section 07 62 00 – Metal Flashing and Trim
.7 Section 09 29 00 – Gypsum Board
.8 Mechanical Division
.9 Electrical Division

1.2. QUALITY

.1 The company performing Work of this Section must be a member and an approved Contractor in good standing with "The Roofing Contractor's Association of Manitoba" and ***shall submit written declaration of this.***
.2 Coordinate the beginning of this Work and regular progress through construction with the Roof Inspector, as hired by The City. Provide a minimum of 48 hours notice prior to inspections.

1.3. REFERENCES – latest editions

.1 CAN/ULC-S107-M is to be considered the roof covering classification, as set out by the National Building Code of Canada
.2 ASTM S1863 Specification for Mineral Aggregate Used on Built-Up Roofs
.3 ASTM D2178 Specification for Asphalt Glass(Felt) Used in Roofing and Waterproofing
.4 ASTM D3672 Specification for Venting Asphalt-Saturated and Coated Inorganic Felt Base Sheet Used In Roofing
.5 ASTM D4601 Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing
.6 CSA A123.3-M Asphalt or Tar Saturated Roofing Felt
.7 CSA A123.4-M Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
.8 CAN/CSA-A247-M Insulating Fibreboard
.9 ASTM D6162-00a Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet materials using a combination Polyester and Glass Fiber Reinforcements.

1.4. REGULATORY REQUIREMENTS

.1 cUL or ULC (Underwriters Laboratories of Canada) Fire Hazard Classifications.

1.5. DELIVERY, STORAGE, AND HANDLING

.1 Deliver products to Site to requirements of Section 01 60 00.
.2 Store and protect products to requirements of Section 01 60 00.
.3 Accept products of this section on-site in new condition and verify no damage.
.4 Store materials in weather protected environment clear of ground and moisture.

1.6. ENVIRONMENTAL REQUIREMENTS

.1 Do not apply membrane during inclement weather.
.2 Follow manufacturer's instructions for application temperature limits.

1.7. WARRANTY

.1 Provide a ten-year [transferable/non-pro-rated] manufacturer's written warranty and a two-year CRCA written warranty covering damage to the building and contents, resulting from failure of Work of this Section to resist the penetration of water under normal service conditions.

.2 Provide a two-year roof warranty audit with Contract Administrator, The City & Roof Subcontractor.

1.8. WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 017421.

.2 Remove from Site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate paper, plastic, polystyrene, corrugated cardboard packaging material for reuse and recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

.6 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.7 Ensure emptied containers are sealed and stored safely.

.8 Divert unused materials from landfill to recycling facility as approved by Contract Administrator. Divert unused aggregate materials from landfill to local facility for reuse as reviewed by Contract Administrator. Divert unused gypsum materials from landfill to recycling facility as reviewed by Contract Administrator.

.9 Unused paint, coating material must be disposed of at official hazardous material collections site as reviewed by Contract Administrator.

.10 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, streams, lakes, into ground, or other locations, where they will pose health or environmental hazards.

.11 Dispose of unused adhesives, sealants, coatings, and asphalt material at official hazardous material collections site complying with applicable regulations.

.12 Fold up metal banding, flatten and place in designated area for recycling.

**PART 2 -PRODUCTS**

2.1 ROOF SHEATHING BOARD

.1 Refer to Roof Construction Type Schedule on drawings and Section 09 29 00.

2.2 AIR/VAPOUR BARRIER FOR ROOF

.1 Water-based low VOC primer for non-combustible substrates: Soprema Elastocol 350, Iko equal, in accordance with Section 01 47 15.

.2 Self-adhesive vapour barrier for combustible roof substrates: Type 'U' as specified in Section 07 25 00.

2.3 INSULATION

.1 Insulation types, thicknesses, slopes, and R-values as noted on Roof Construction Type Schedule on drawings.

.2 Tapered rigid insulation to CGSB 51-GP-20M: Type 2 expanded polystyrene board as specified in Section 07 21 13. 1200 x 1200mm (4'x4') x thicknesses required to achieve back-slopes, crickets, and angles away from parapets and other roof mounted objects, as indicated on drawings, sloping down to roof drains (minimum 2% slope). At roof drains, provide a 600 x 600 (24" x 24") 'flat' area typically. Submit customized

shop drawings showing proposed tapered insulation layout, roof drain locations, and any other related areas.

.3 Base roof insulation (for cold-applied mod bit roof system): Type 6, closed-cell polyisocyanurate foam insulation boards. Bottom layer laminated both sides with fibre reinforced felt; 'Sopra-Iso' by Soprema. Top layer laminated both sides with a heavy coated glass filament facer; 'Sopra-Iso Plus' by Soprema.

.4 Insulation adhesive: low-rise polyurethane two-part adhesive product. Soprema Mammoth Duotack.

2.4 ROOF MEMBRANE MATERIALS

.1 Cold-applied Self-adhesive Base Sheet: semi-independent, SBS modified bitumen glass mat reinforced membrane with self-adhesive bottom surface and top surface coated with sand, with three distinctive lines for roll alignment, conforming to CGSB 37-GP-56M, Type 2, Class C, Grade 2. Thickness: 2.2mm. Acceptable product: Soprema Colvent Base 820.

.2 Cold-applied Base Sheet Stripping (Flashing) and upstand system: self-adhesive base sheet membrane with SBS modified bitumen reinforced with a polyester and glass composite reinforcement, top face of sand and underface of silicone release film, conforming to CGSB 37-GP-56M, Type 2, Class C, Grade 2. Thickness 3mm (2.8mm min.) winter grade. Acceptable products: Soprema Sopralene Stick Adhesive.

.3 Cold-applied Cap Sheet and Cap Sheet Stripping (Flashing): High performance cap sheet membrane composed of SBS modified bitumen and a composite reinforcement, with surface of coloured granules and underface of a release protection film, conforming to CGSB 37-GP-56M, Type 2, Class C, Grade 2. Approximate thickness 3.8mm. Apply membrane only as recommended by manufacturer. Acceptable products: Soprema Sopralene Stick HR GR. Colour to be selected by Contract Administrator from standard range.

.4 Accessory membranes: membrane strip of SBS modified bitumen and composite elastomeric bitumen reinforcement, with top face sanded and self-adhesive underface protected by a removable film. Acceptable product: Soprema Sopralap Stick .

.5 Flexible membrane for expansion joints: waterproof membrane of polyester fabric with SBS modified bitumen and a root-repelling agent. Bottom face with a thermofusible plastic film. Top face with an aluminum foil adhered to the centre of the membrane and covered by a protective silicone paper, to be removed during application. Nominal thickness: 4mm. Acceptable product: Soprema Soprajoint, IKO equivalent.

2.5 PRIMER (for self-adhesive membranes):

.1 Composed of SBS synthetic rubber, adhesive enhancing resins, and volatile solvent used to prime porous substrates and non-porous substrates such as wood, concrete or metal to enhance the adhesion of self-adhesive membranes at temperatures above - 10°C. Acceptable product: Soprema Elastocol Stick .

2.6 ADHESIVES

.1 Insulation adhesive: highly elastomeric, two component, one step, all purpose, foamable adhesive that contains no solvents and sets in minutes. Acceptable product: Soprema Duotack .

.2 Membrane adhesive (for upstands): High performance SBS modified bitumen adhesive that contains no asbestos, is easy to apply, and provides superior resistance to severe weather conditions, with low solvent content to reach optimum adhesion within 24 to 48 hours. Acceptable product: Soprema Colply Adhesive Trowel Grade .

2.7 COMPLEMENTARY WATERPROOFING PRODUCTS

.1 Waterproofing mastic: composed of synthetic rubbers, plasticized with bitumen and solvents, and aluminium pigments for UV resistance. Approved product: Soprema Sopramastic (Alu).

.2 Pitch pocket filler: Soprema Interclip .

.3 Sealing product: composed of a bitumen/polyurethane waterproofing mono-component and polyester reinforcements, to finish upstands and details (no-flame installation). Acceptable product: Soprema Alsan Flashing.

2.8 FASTENERS

.1 Membrane fasteners: #14 Phillips screws of case-hardened carbon steel with a rust preventive coating that comply with FMR approval standards. 50mm (2") diameter with barbed stress plates that comply with the CSA B35.3 and FM 4470 approval standard. Acceptable product: Soprema Soprafix Fasteners/plates, or FM equal for the specified system.

2.9 ACCESSORIES

.1 Roofing nails: In compliance with CSA B111, Table 12, nails shall be made of galvanized steel, long enough to penetrate wood substrate by at least 20 mm.

.2 Mechanical fasteners:

.1 Round top cap nails, 25, 38mm, or equivalent, stainless steel or galvanized fasteners, as recommended by manufacturer or as required for the purpose.

.2 In compliance with CSA B111, Table 12, nails shall be long enough to penetrate the substrate by at least 20mm on flashings and parapet walls.

.3 Screw fasteners as recommended by the insulation manufacturer, long enough to penetrate the steel decking as required for warranty purposes.

.4 **Where steel deck or acoustic steel deck is scheduled to be exposed on the underside, colour match screws to deck colour, select the screw length not to penetrate the finished bottom flute surface, and carefully locate screws to penetrate only the top flutes,** as recommended by manufacturer.

.3 Loose granules, composition and colour to match granule surface of roofing membranes. Granules to be embedded into heated asphalt surfaces at joints between rolls or at any other locations where the visual continuity of the granule surface is interrupted.

.4 Metal flashings: Refer to Section 07 62 00 "Metal Flashing and Trim".

.5 Roof drains, vents, and pipe sleeves/flashings: Refer to Mechanical Division.

.6 Roof Wire outlet posts: a seamless, aluminum post with PVC cap, wide flashing flange, heavy gauge base, factory polyethylene foam insulation, and weather-tight construction for extending flexible wires and cables through a flat to low slope roof deck. In compliance with UL and CSA for wet locations. Standard size, 51 (2") I.D. x 300 (12") high, unless otherwise noted. Acceptable product: Flash-Tite wire outlet post by Lexcor.

**Part 3 - EXECUTION**

3.1 FIRE PROTECTION

.1 Prior to the start of work, conduct a site inspection to establish safe working practices and make sure that all procedures and proposed changes are approved to minimize the risk of fires.

.2 Respect safety measures described in the manufacturer's Specifications Manual as well as CRCA recommendations.

.3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed fires. Job planning must be organized to ensure workers are still on location at least one hour after torch application.
.4 Never apply the torch directly to old and wood surfaces.
.5 Throughout membrane installation, maintain a clean site and have one approved ABC fire extinguisher within 6 meters of each propane torch. Respect all safety measures described in technical data sheets. Torches must never be placed near combustible or flammable products. Torches should never be used where the flame is not visible or cannot be easily controlled.

3.2 SURFACE EXAMINATION AND PREPARATION

.1 Complete roof surface examination and preparation in conformance with the recommendations in the Manufacturer's Specifications Manual.
.2 Before roofing work begins, the Roof Inspector and Roofing Foreperson will inspect and review deck conditions (including slopes and blocking) as well as upstands and parapets, construction joints, roof drains, plumbing vents, ventilation outlets and others. If necessary, a non-conformity report will be issued to the Contractor so that required corrections can be made.
.3 Verify that substrate is supported and secured; any gaps larger than 12mm (1/2") need to be filled with solid backing.
.4 Verify that substrate is clean, smooth, free of depressions, waves, or projections, dry and free of snow or ice. Do not install materials during rain or snowfall.
.5 Verify that roof openings, curbs, sleepers, equipment support, housekeeping pads, pipes, sleeves, ducts and vents through roof are solidly set, and cant strips are in place, where applicable.
.6 Verify that surfaces and site conditions are ready to receive work. Beginning of installation means acceptance of substrate.
.7 No materials will be installed during rain or snowfall.

3.2 METHOD OF INSTALLATION

.1 Prepare surfaces and complete waterproofing work in conformance with the manufacturer's requirements, and "Roofers' Guide"
.2 Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.
.3 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.
.4 It's preferable to seal all seams that are not covered by a cap sheet membrane in the same day. The cap sheet cannot be installed if any moisture is present at/in the base sheet seams.
.5 Whenever membranes are torch-applied, a continuous and even bead of molten bitumen must be visible as the membrane is unrolled and torched.
.6 Ensure waterproofing conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. vents, drains, etc.).
.7 Complete all work (temporary supports for equipment and bases, disconnection and connection of equipment as needed, moving and lifting of bases, etc.) required for waterproofing beneath equipment and bases [as shown on drawings]; use qualified trade persons as required. Temporary supports for waterproofing beneath air-conditioning units must be designed to hold supported loads and distribute these loads to avoid structural damage. Avoid interruption of functioning equipment during roofing.
.8 Maintain all roofing equipment and tools in good working order.

3.3 FASTENING OPTIONS

.1 Where metal decks will be concealed by suspended ceilings or will be exposed, mechanically fasten roof sheathing board and other roof components, as recommended by manufacturers, and as specified in 2.5.2.3.
.2 Where wood decks will be exposed, mechanically fasten roof system with screws to a 25 (1") penetration into the top of the fir decking only. Screws must not go through this decking and shall follow the manufacturer's recommended fastening pattern.
.3 Roofing Contractor to submit fastening pattern shop drawing prior to commencement of work. Pattern(s) shall include penetration, perimeter, corners and field zones.

3.4 INSTALLATION OF AIR/VAPOUR BARRIER

.1 Apply air/vapour barrier to cover entire roof area, leaving flaps at edges to tie into adjacent wall/roof barriers. Minimize joints and lap all joints as recommended by the manufacturer.
.2 Cover all inside corners with a 150 (6") wide membrane strip, centred on the corner, and in direct contact with substrate, not leaving any voids under the membrane strip. \
.3 Repair tears and holes in membrane with appropriate membrane material and exceed affected surface area by at least 100 (4").
.4 Inspect membrane meticulously at end of each day and prior to insulation installation.
.5 Follow with insulation installation as soon as possible after air/vapour barrier inspection.

3.5 INSTALLATION OF INSULATION

.1 Where tapered insulation layer (cricketed areas) are indicated, place under the bottom layer of the base insulation typically. Apply insulation adhesive with spots 75 (3") in diameter, every 300 (12") on centre, and as recommended by manufacturer.
.2 On top layer of insulation, apply a continuous bead of adhesive, 25 (1") wide to the top leading edge of the panel to be glued. This bead will protect adhesive spots during initial cure by limiting the flow of moisture behind the insulation in case of rain.
.3 Where gaps in base insulation boards occur that are larger than 3 (1/8"), carefully fill all **g**aps flush with a low expansion spray foam
.4 Respect Factory Mutual standards [1-60] [1-90] pertaining to number and placement of fasteners, namely Bulletin 1-28 for fastening to roof perimeters and corners.
.5 All vertical joints between boards and insulation will be staggered.
.6 All the panels must be in perfect connection, without any significant differences in level, and must be adhered on all of their surfaces completely.
.7 Apply only as many boards as can be covered in the same day.
.8 Around roof drains, cut out a slight slope of 0 to 10 mm in a 600mm radius.

3.6 INSTALLATION OF FLAME-STOP MEMBRANES

.1 Adhere the membrane directly onto an approved substrate by peeling back the silicone release film. Soprema Sopraguard Tape or equal, shall be designed to prevent flames from penetrating into empty spaces and openings while installing heat-welded membranes.
.2 Unroll flame-stop membrane onto the insulation without adhering, being careful to overlap adjacent strips to ensure that the flame will not come in contact with the insulation.

3.7 BASE SHEET APPLICATION

COLD APPLIED SELF-ADHESIVE BASE SHEET:
.1 Beginning at the drains and perpendicular to the slope, install the base sheet membrane without adhering in parallel strips.
.2 Each strip should overlap the preceding strip by 75mm (3"). along the side joint (use the blue line to facilitate alignment) and by 25mm (1") at the ends. Because of the

nature of this system, base sheet membrane joints can be aligned (no staggering) to facilitate the installation of the reinforcing band.

.3 Let the membrane relax at least 15 minutes before installing it, or burn the plastic film in a zig-zag fashion using a propane torch to relax it. In cold weather, use the second method.

.4 Peel back the silicone release paper to adhere the membrane to the substrate. Use a broom or brush to apply even pressure and ensure good adherence.

.5 Remove the paper protecting the selvedge, then heat the side joints. Seal the joints using a trowel. A bead of molten bitumen should appear along the joint to ensure a perfect seal.

.6 For flame-free installations, seal the side joints and install a protection band over the end joints using the membrane adhesive specified.

.7 Avoid creating wrinkles, blisters, and fishmouths.

.8 The base sheet membrane should end at the edge of the substrate.

.9 Install screws and washers every 300mm (12”) c/c along the edge of the substrate.

3.8 INSTALLATION OF REINFORCED GUSSETS

.1 Install gussets at every change in angle and on inside and outside corners.

.2 Install self-adhesive gussets before the self-adhesive base sheet

.3 Install reinforcements as specified for adhered roof surfaces according to the instructions and illustrations found in the manufacturer’s technical data.

3.9 INSTALLATION OF BASE SHEET STRIPPING (FLASHING)

.1 Ensure any primer coatings are dry before application of base sheet stripping.

.2 Apply base sheet stripping to extend a minimum of 250mm (10”) horizontally over top of the base sheet, up the inside face of the parapet wall, and over the top of parapet, extending a minimum of 50mm (2”) beyond the outside face.

.3 Totally encapsulate roof top curbs and other upstands with base sheet stripping.

.4 Install a reinforcing gusset in all inside and outside corners.

.5 Always seal overlaps at the end of the workday.

3.10 INSTALLATION OF CAP SHEET

.1 Unroll cap sheet starting from low point of roof. Re-roll cap sheet from both ends prior to torching. Take care to align edges of first roll.

.2 Apply cap sheet to base sheet in strict accordance with manufacturer's instructions and details.

.3 Stagger base sheet and cap sheet seams by a minimum of 300mm.

.4 Provide cap sheet side laps of 75mm and end laps of 150mm. Surface granules on end laps must be embedded prior to installation of following sheet. Provide a uniform pattern of cap sheet end laps.

.5 After installation of the cap sheet, check all seams.

.6 Apply primer to cap sheet before installing walkways.

3.11 INSTALLATION OF CAP SHEET STRIPPING (FLASHING)

.1 Lay cap sheet stripping in strips one metre wide to the vertical surface, extending onto the flat surface of the roof a minimum of 150mm (6”). Side laps are to be 75mm (3”) wide and staggered a minimum of 100mm (4”) with the laps of the cap sheet.

.2 Lay out a straight line on the cap sheet surface, parallel to the roof edge, 150mm inside the roof from the base of the cant strip, and embed surface granules into the heated and soft bitumen, from the chalk line to the edge of the cap sheet.

.3 Torch weld cap sheet stripping directly on its base sheet from bottom to top.

3.12 SERVICE WALKWAYS

.1 For rooftop walkway areas generally around, and between roof hatches and rooftop equipment, install a second layer of the same cap sheet but in a contrasting colour, for the full roll width. Refer to drawings for layout.

3.13 EXPANSION JOINTS

.1 Install expansion joints in accordance with manufacturer's instructions and details.

3.14 REINFORCING MEMBRANE

.1 Lay 150 wide strip of base sheet at edge of roof so that 50mm laps onto edge flashing.

3.15 FIELD QUALITY CONTROL

.1 Perform work on a continuous basis as surface and weather conditions allow.
.2 Protect adjoining surfaces against any damage.
.3 During installation, the Roof Contractor shall have tradesmen on-site who have a minimum of 40 hours of supervised, hands-on training of SBS membrane application.
.4 Field inspection and testing will be performed through Cash allowances. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.
.5 Coordinate and notify the appointed Roof Inspector at least 48 hours in advance of the proposed start of the roofing application at each critical stage of work.
.6 Correct all identified defects or irregularities as work proceeds.

3.16 SITE PROTECTION

.1 Protect finished work to avoid damage during roof installation and material transportation. Install protective boardwalks over installed roofing materials to enable passage of people and products. Assume full responsibility for any damage.

3.17 CLEANING

.1 The Site must be routinely cleared of rubbish and other materials which may hinder roof installation, performance, or present a fire hazard.

**END OF SECTION**

## Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures
.2 Section 07 21 13 - Board Insulation
.3 Section 07 25 00 – Air/Vapour Barriers
.4 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 DESIGN LOADS

.1 Design of roofing/cladding system to conform to Manitoba Building Code, latest edition.

1.3 SUBMITTALS

.1 Submit shop drawings to requirements of Section 01 33 00. Indicate dimensioning, panel layout, general construction details, transition details, type and spacing of anchorage, and method of installation. Provide engineered shop drawings, sealed and signed by a Structural Engineer registered in the Province of the Work, for review prior to fabrication.
.2 Upon request, submit samples to Section 01 33 00.

1.4 WARRANTY

.1 Provide a written manufacturer's warranty that the finish will not chip, crack, peel, or lose adhesion for forty (40) years, and that the degree of colour fade and surface chalk will be within the manufacturer's Performance Criteria for thirty (30) years, from the original date of purchase.
.2 Provide a written installer's warranty against any defects in labour and workmanship, for one (1) year from the Date of Substantial Performance.

## Part 2 PRODUCTS

2.1 SHEET MATERIALS

.1 Underlay Air Barrier for full extent of sloped roof: Type 'H' as per Section 07 25 00.
.2 Eave and Valley Protection: Type 'B' as per 07 25 00.

2.2 PREFINISHED METAL ROOFING/WALL CLADDING SYSTEM

.1 Prefinished Sloped Metal Roof System (SSR) and wall cladding system: to ASTM A525, Grade A, Z275 zinc coating; minimum 24 gauge, pre-coated galvanized steel, with standing seams, and a concealed fastener clip system for thermal shock, expansion and contraction. Acceptable Systems: Vicwest Tradition 100 with I-style standing seam 33mm height with snap-on cap, 400mm wide panels, 22-gauge steel, mechanically fastened (no exposed fasteners on minimum slope 3:12), OR Accu-Steel metal roof system by Flynn. Colour to be selected by Contract Administrator from full standard range available, in the Weather XL series by Valspar.

2.3 ACCESSORIES

.1 Isolation Coating: Alkali resistant bituminous paint. Provide isolation coating wherever dissimilar metals may come in contact with each other.
.2 Sealants: In accordance with manufacture's specifications to be applied in panel longitudinal female rib. Field or factory applied to be extrudable, non-drying, non-skinning synthetic elastomeric material. Sealant tape at panel terminal locations to be an extruded, non-skinning resilient formed butyl compound. (Also see specified sealants in Section 07900).
.3 Plastic cement: to CGSB 37-GP-5M
.4 Rubber-asphalt sealing compound: to CGSB 37-GP-29M.

.3 Miscellaneous Materials: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants ventillators, roof jacks, closures, trim and accessory items as recommended by metal roofing manufacturer, except as otherwise indicated.

.4 Snow slide stops: Continuous lengths of prefinished metal bar-type snow slide stops above entries and where indicated on drawings; one colour to be selected by Contract Administrator. Provide engineered shop drawings, sealed and signed by a Structural Engineer registered in the Province of the Work, for review, prior to fabrication or purchase.

.5 Sheet Metal Flashings & Trim: refer to Section 07 62 00.

.6 Rigid Insulation: refer to Section 07 21 13.

## 3 EXECUTION

### 3.1 INSPECTION

.1 Inspect roof deck to verify that it is clean and smooth, free of depressions, waves, or projections, properly sloped to eaves.

.2 Verify deck is dry and free of snow or ice. Verify joints in wood deck are solidly supported and fastened.

.3 Verify eave protection is in place, sealed, and secure.

.4 Beginning of installation means acceptance of existing conditions.

### 3.2 PREPARATION

.1 Field measure site conditions prior to fabricating Work.

.2 Install starter and edge strips, and cleats before starting installation.

.3 Coordinate metal roofing with rain drainage Work, flashings, and trim to provide a permanently leak proof, secure, and non-corrosive installation.

### 3.3 INSTALLATION

.1 Locate and install roof panels in strict accordance with Contract drawings, shop drawings, and manufacturer's instructions.

.2 Install roof panels with ribs up and attached to supporting members by concealed clips.

.3 Ensure each female rib is furnished with a continuous bead of factory applied or field-applied sealant before interlocking with male rib.

.4 Provide thermal blocks to support metal panels in between standing seam support clips and at same on center spacing as standing seam support clips. Stagger as per note on drawings.

.5 Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

.6 Install paper slip-sheet over eave protection underlayment on substrate under metal roofing to greatest extent possible unless otherwise recommended by manufacturer of sheet metal. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal roofing. Lap joints 2" minimum.

.7 After roof panels are in place, mechanically crimp the interlocking ribs and concealed clip to provide a weather-tight seal.

.8 Touch up all marks and scratches with matching paint supplied by roof manufacturer.

.9 Install roof jacks at mechanical vent penetrations through roof.

.10 Install integral gutters and downspouts as per section 07631 and drawings.

.11 Install required closure flashings and trim to suit metal roof system of roof protection.

.12 Install continuous snow slide stops at eaves where intended and in accordance with the reviewed shop drawings.

#### 3.3.1 CLOSURES

.1 Install closures in accordance with shop drawings.

.2 Provide notched and formed closures, sealed against weather penetration, at changes in pitch and at ridges.

3.4 FLASHINGS

.1 Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Contract Administrator.
.2 Lock end joints and caulk to provide weather-tight seal. Seal all joints watertight.
.3 Apply plastic cement compound between metal flashings and felt flashings.
.4 Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
.5 Install flashings where required and make watertight seal.

**END OF SECTION**

## Part 1 GENERAL

1.1 WORK INCLUDED

.1 The Work included under this section shall conform to the industry standard and be accepted by the local construction and trade associations.

## Part 2 PRODUCTS

2.1 SHEET MATERIALS

.1 Flashings, Fascias, and Bent Closures above grade: 24-gauge (0.6mm) core steel, factory pre-coated in Canadian SMP Standard Colour series; four colours to be selected by Contract Administrator from full range available.

.2 Foundation flashing and Fascia flashing: 20-gauge (0.89mm) core steel, factory pre-coated in Canadian SMP Standard Colour series; one colour to be selected by Contract Administrator from full range available.

.3 Aluminum flashings (where curtain wall, window frames, and adjacent surfaces are aluminum): 22 gauge thickness, to match finish on aluminum frames.

.4 Scuppers and downspouts: 24-gauge core material, precoated steel or prefinished aluminum; allow for two colours as selected by Contract Administrator from standard range. Scuppers as indicated and detailed on the drawings. Unless noted otherwise, downspouts to be 200mm (8”) wide x 150mm (6”) deep with an open front face, and horizontal straps @ 900 o.c..

2.2 ACCESSORIES

.1 Fastener: Prefinished steel with fiberglass reinforced nylon head and soft neoprene washer, at exposed locations. Exposed fasteners to match same colour as flashing and fascias.

.2 Sealant: clear silicone as per Section 07 92 00.

2.3 FABRICATION

.1 Form sections true to shape, accurate in size, square, and free from distortion or defects.

.2 Fabricate cleats, clips, and starter strips of same material as sheet, inter-lockable with sheet.

.3 Form pieces in longest practical lengths.

.4 Hem exposed edges on underside 13 mm; miter and seam corners.

.5 Form material with flat lock seam.

.6 Seal all joints with silicone.

.7 Fabricate corners from one piece with minimum 450 mm long legs; solder for rigidity, seal with silicone sealant.

.8 Fabricate vertical faces with bottom edge formed outward 6 mm and hemmed to form drip.

.9 On exposed faces, return drip edge hem back to form interlock with concealed clip. Provide continuous clips at all exposed faces.

.10 Fabricate flashings to allow toe to extend 50 mm over roofing. Return and brake edges.

## Part 3 EXECUTION

3.1 INSPECTION

.1 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

.2 Verify membrane termination and base flashings are in place, sealed, and secure.

.3 Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

.1 Field measure site conditions prior to fabricating Work.
.2 Install starter and edge strips, and cleats before starting installation.

3.3 INSTALLATION

.1 Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
.2 Secure flashings in place using concealed continuous clip fasteners at all visible flashings. Use exposed fasteners only in locations not ordinarily visible (e.g. - inside parapet walls). All exposed fasteners must be on vertical surfaces.
.3 Apply plastic cement compound between metal flashings and felt flashings.
.4 Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
.5 Seal metal joints watertight.

**END OF SECTION**

## PART 1 GENERAL

1.1 GENERAL DESCRIPTION OF WORK OF THIS SECTION

1. Provide fire and smoke stop systems consisting of a material, or combination of materials installed to maintain the integrity of the Fire Resistance Rating of the fire separation by maintaining an effective barrier against the spread of flame, smoke, heat and / or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to the Fire Separation in accordance with the requirements of the Manitoba Building Code, latest edition.

.2 Only tested fire and smoke stop design listed systems shall be used in specific locations as follows and also as indicated in the schedule of firestop locations, Item 3.4:

.1 Service Penetrations for the passage of duct, cable tray, conduit, piping, electrical bus ways and raceways, empty / blank openings through vertical fire separations (walls and partitions), horizontal that have a fire separation (floor/ceiling assemblies), and vertical service fire separation shaft walls and partitions.

.2 Safing slot gaps between edge of floor slab fire separations and curtain walls.

.3 Openings between structurally separate sections of walls or floors that have a fire separation.

.4 Joints between the bottom of walls (gypsum board to floor system)

.5 Wall-to-wall joints (gypsum board to concrete or concrete block walls or control/expansion joints for masonry, concrete or gypsum board).

.5 Joints between the top of walls and ceilings or floor and roof assemblies, slip joint or concrete shrinkage joint detail.

.6 Mechanical and electrical recessed boxes through fire resistant membranes.

.7 Floor Expansion Joints (floor to floor, floor to wall).

.8 Control or expansion joints in vertical and horizontal fire separations.

.9 Systems installed to allow and be designed to accommodate movement (expansion) in all joints as indicated on architectural / structural drawings/specifications and plumbing pipes and sprinkler pipes that require movement during the activation of these systems.

.10 Openings around structural members, which penetrate horizontal and vertical fire separations and their fire resistant membranes.

.11 Fire-rated cable pathway devices.

.12 Marriage joints between fire rated duct wrap to fire rated floor and wall assemblies.

.3 All fire separations to have a Fire Resistance Rating to them as indicated on drawings. All Non-rated Fire Separations to be assigned a 1-hour Fire Resistance Rating and a F Rating of 1-hour minimum. Both sides of a non-rated fire separation to have a tested fire and smoke stop design listed system applied, to match or exceed the F-rating, as indicated.

.4 All multiple service penetration through a fire separation must have a minimum space equal to the same size of the smallest pipe or greater, minimum 50mm, between pipes to be considered an individual services penetration. Penetrations where the space between penetrating items is less than 50mm will be classified as a multi-penetrations and a square or rectangular opening shall be constructed around the penetrations with a fire and smoke stop design listed system applied to the entire opening.

.5 All horizontal and vertical fire separations are indicated on Drawing Documents, including Firestop Rating Requirements, assign time and construction types (assemblies). Firestop Subcontractor to include appropriate Design Listed Systems for each horizontal and vertical fire separation.

1.2 REFERENCES, latest edition of each.

.1 Standard Method of Fire Tests Through Penetration Fire Stops to ULC-S115-M/ CAN4-S115-M (or ASTM E814 or UL 1479) if accepted by the Authority Having Jurisdiction).

.2 FIRE RESISTANCE RATINGS DIRECTORY, ULC – list of equipment and materials for firestop systems and components.

.3 FIRE RESISTANCE DIRECTORY-UL, to meet the requirements of ULC-S115-M are given a cUL listing (products certified for Canada).
.4 Latest edition of the ULC or cUL, Listings for Firestop Systems and Components.
.5 Tests for Fire Resistance of Building Joint Systems, UL 2079, Test Requirements.
.6 Standard Tests for Resistive Joint Systems, ASTM EI966 under designation UL 2079.
.7 Cyclic movement and measuring the minimum and maximum joint widths of Architectural Joint Systems, ASTM E1399.
.8 Test Requirements: ASTM E2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Storey Test Apparatus".
.9 Standard Test Method for Surface Burning Characteristics of Building Materials, CAN/ULC-S102-M or ASTM E84.
.10 Method for Fire tests of Building Construction and Materials to CAN/ULC-S101 or ASTM E119.
.11 International Firestop Council Guidelines (IFC) for Evaluating Firestop Systems Engineering Judgements (EJ).
.12 International Firestop Council (IFC) Inspection Guideline and ASTM E2174, Standard Practice for on-site Inspection of Installed Firestop Systems and ASTM E2393, Standard Practice for on-site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
.13 M.O.P. Manual of Practice, (MOP) Guideline as set out by the Firestop Contractors International Association (FCIA).
.14 National Building Code and the Provincial Building Code of the Province that the Authority Having Jurisdiction is responsible for.
.15 NFPA 101-Life Safety Code,
.16 Canadian Electrical Code
.17 Approval standard for approval of Firestop Contractor:
  .1 ULC – Qualified Firestop Contractor Program
  .2 UL – Qualified Firestop Contractor Program
  .3 FM 4991 – Approval Standard for Approval of Firestop Contractors

1.3 QUALITY ASSURANCE
.1 Work is to be undertaken by experienced Subcontractor of material or system being used with a minimum of five (5) working years of experience utilizing that material/system, and shall provide a list of not less than five (5) successfully completed projects of similar scale and type.
.2 All workers shall be certified by the manufacturer of the products and systems proposed for the Installation of this product. Proof of this certification will be required 48-hours after award of the project.
.3 Firestop Subcontractor to be a member of the Firestop Contractors International Association (FCIA) and be in good standing with this association. Contractor to provide within 48 hours after award of the project proof of their association of the FCIA.
.4 Manufacturer shall ensure that their Fire Protection Engineers will oversee the project, and have a minimum five (5) years experience on the manufacturers design systems.
.5 Manufacturers shall provide a letter in writing with shop drawing submittals, that any "Engineered judgements shall be provided by their Fire Protection Engineer(s) as required to suit building conditions". All Engineered Judgements shall conform to IFC guidelines and the manufacturer shall be a member in good standing with the IFC or FCIA. Proof of membership to the IFC or FCIA shall also be submitted with shop drawings.
.6 A qualified manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate trade personnel in proper selection and installation procedures, in accordance with manufacturer's written recommendations published in their literature and installation procedures.
.7 Firestop Systems do not re-establish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

.8 For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a Manufacturer's Engineered Judgement derived from similar ULC or cUL system designs or other tests will be submitted to local Authorities Having Jurisdiction for their review and approval prior to installation. Engineered Judgement drawings must follow requirements set forth by the International Firestop Council Guidelines

.9 A single source of Manufacturer Product shall be used on this Project. Materials of different manufacturers shall not be acceptable, unless otherwise indicated in this Section.

.10 Manufacturer to provide a written letter within 48-hours after the award of the project that if their systems are exposed in finished areas that their installed products can be primed and painted over to match the architectural finishes within those areas. If the Manufacturer deems that alternative methods may be required to allow their systems to be primed / painted over, they shall notify the Firestop Subcontractor prior to bid closing to allow the Firestop Subcontractor to alter their bid prior to closing. Firestop Subcontractor to include any additional; costs within their bid to suit this application.

1.4 DESCRIPTION

.1 This section specifies firestopping material and/or systems intended to act as a fire stop and smoke seal system to protect against the passage of fire, hot gases and toxic smoke within fire separation for the Fire Resistance Rating of a wall, floor, ceiling or roof assemblies for any through-penetration item, membrane penetration poke-through termination device, blanks, gaps, voids or any un-penetrated joint or opening, to form a draft-tight barrier within or between construction assemblies and act to retard the passage of flame, smoke and toxic gases.

1.5 SAMPLES

.1 Submit material samples of each type of proposed product in un-opened containers including all anchors/fasteners and damming material. These products shall be taken from the same batches / boxes of products that will be used on-site. Each product shall be tagged indicating the shelf life expiry date.

.2 Upon request submit sample mock-ups of each system, no larger than 600 x 600mm, 1-week prior to on-site mock-ups.

.3 Submit a sample of the proposed assembly identification penetration / joint plate.

.4 Submit sample of each fire separation (barrier) marking on a layer of 16mm gypsum board, 600 x 600mm in size. All edges have one layer of tape around the entire sample board. Provide sample of each marking on board sample.

.5 Submit copy of Life expectancy of each product installed from date of installation.

1.6 INSTALLER QUALIFICATIONS

.1 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacture's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

.2 The Work is to be installed by a contractor with at least one of the following qualifications:

.1 FM 4991 Approved Contractor

.2 UL Approved Contractor

.3 Hilti Accredited Fire Stop Specialty Contractor

. 4 Installer shall have not less than 3 years' experience with fire stop installation.

1.7 DESIGN SYSTEM LISTINGS/SHOP DRAWINGS

.1 Submit Design System Listings, product data and Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00. Also provide the following product data on each proposed product:

.1 Technical data on out-gassing; off gassing and age testing.
.2 Curing time.
.3 Chemical compatibility to other construction materials.

.2 Provide Certification by the Manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are non-toxic to building occupants.
.1 According to ASTM E595.
.2 Test Method: Environmental Protection Association, EPA Method 24.
.3 Indoor Environmental Quality: Volatile Content: below 250 g/l.

.3 To meet LEED requirements, refer to LEED procedures. Provide product data to suit this requirement.

.4 Design System Listings shall show proposed material, including technical data, reinforcement, anchorage, fastenings and method of installation. Construction details shall accurately reflect actual job conditions.

.5 Manufacturer may submit product data for materials and prefabricated devices, provided that descriptions are sufficient for identification at the Site. Include Manufacturer's printed instructions for installation.

.6 Provide ULC or cUL Design System Listings complete with product literature and MSDS sheets on each system for each application, for each area as indicated.

.7 When more than one product is specified for the firestop Design Listing System or more than one backing/damming material is indicated, the firestop trade shall circle the item that they have chosen to use on this project.

.8 Provide a list (matrix) of products, identifying the following for each.
.1 Product Name.
.2 Shelf Life.
.3 Life Expectancy.
.4 Temperature Range for installation.
.5 Humidity Range for installation.
.6 Curing Time.
.7 If required, alternative method to allow paint and primer to be applied over the installed system when exposed to finished areas.

.9 Where there is no specific tested Design System Listings by the Prime Manufacturer and research from all other manufacturers has determined that no system is available for particular firestop configuration, the Firestopping Subcontractor shall obtain from the Prime Manufacturer an Engineered Judgement (EJ) for submittal. Each EJ shall come with a drawing of the proposed system, a description of the system, Project Name and Room Name/Number that the EJ is located in, copies of all referenced Design Listings and signed/dated by the Manufacturer's Fire Protection Engineer. All EJ's must comply with the International Firestop Council (IFC) Guidelines for evaluating firestop systems Engineer Judgement. Note: Once the EJ has been reviewed, the Contractor shall submit the EJ to the Authority Having Jurisdiction (AHJ) for their acceptance, prior to installing the EJ. The Firestop Subcontractor must receive written approval by the AHJ.

.10 Engineering Judgements (EJ's)
.1 EJ's shall be issued in lieu of tested systems when a tested Design Listing is not available for the current on site conditions.
.2 EJ's shall be issued only by firestop manufacturer's qualified technical personnel or, in concert with the manufacturer, by: a knowledgeable registered Professional Engineer, a Fire Protection Engineer, or an independent testing agency that provides listing services for firestop systems.
.3 EJ's shall be based upon interpolations of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgement is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire-testing guidelines (e.g. ASTM E2031 – Standard Guide for Extension of Data from Fire Endurance Tests) may also be used as further support data.

.4 EJ's shall be based upon full knowledge of the elements of the construction to be protected and understanding of the probable behaviour of that construction and the recommended firestop system protecting it were they to be subjected to the appropriate Firestop Standard Fire Test method for the required fire rating duration.

.5 EJ's shall be limited to the specific conditions and configurations upon which the engineering judgement was rendered and should be based upon reasonable performance expectations for the recommended firestop system under those conditions.

.6 EJ's shall be accepted only for a single specific job and location and should not be transferred to any other job or location without thorough and appropriate review of all aspects of the next job or location's circumstances.

.7 EJ's shall be accepted in jurisdictions that permit Alternative Methods per applicable Model Building Code.

.11 Submit design listings / shop drawings as follows:

.1 Submit shop drawings in accordance with section 01 30 00.

.2 Bind shop drawings in a minimum of seven (7) vinyl hard covered Acco Customized three D-ring binders for 215 x 280mm size paper. Note: Binders not to be more than 2/3 full.

.3 Enclose title sheet, labelled "Fire and Smoke Stop System Drawing Design System Listings", project name, date, installation company name, and product manufacturer name. Insert title in front and spine of binder.

.4 Include a Table of Contents at the front of each binder. Provide a Table of Contents at the front of each binder.

.5 Provide a list of each proposed Design Listing and corresponding service penetration type or joint type in a matrix spreadsheet schedule, indicating floor and wall system, including rating for each.

.6 Provide a list of each proposed Design Listing with approximate total quantity or amounts of each listing per floor on separate sheet.

.7 Each penetration shall be numbered corresponding to the exact same number of the plate penetration no. as identified in 2.1.13.

.8 Organize each floor, wall and ceiling area indicating each room number, labelled with tabs of celluloid covers fastened to hard paper dividing sheets.

.9 Provide copies of all fire and smoke stop system ULC or cUL Design No. listings for each penetration type for all areas located.

.10 Provide product data, MSDS and all other technical data information required as indicated in Item No. 1.6.1 to 1.6.11.

.11 Provide certifications of each installer proposed on working on the Project.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials undamaged in manufacturer's clearly labelled, unopened containers, identified with brand, type, and ULC or cUL label, complete with batch number, manufacturing date and shelf life expiry date.

.2 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

.3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

.4 Comply with recommended procedures, precautions or remedies described in Material Safety Data Sheets (MSDS) as applicable.

.5 Do not use damaged or expired material.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Do not install firestopping when ambient or substrate temperatures are outside limits permitted by Manufacturers or when substrates are wet, due to rain, frost, condensation, or other causes.

.2 Maintain this minimum temperature before, during and for three (3) days after installation of materials.

.3 Ventilate firestopping per Manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

.4 During installation provide masking and drop sheets to prevent firestopping materials from contaminating any adjacent surfaces.

.5 Do not use materials that contain flammable solvents.

.6 Water based products are unacceptable in wet areas or areas that may be subject to occasional flooding.

1.10 PRECONSTRUCTION MEETING

.1 The "Standard Construction Project Firestop Guideline" shall be reviewed in a meeting approximately two weeks after the award of the Project with the Contractor and all affected Subcontractors.

.2 After Design System Listings Shop Drawings are reviewed by the Contract Administrator and one week prior to the mock-up installation, the Contractor shall request that a mandatory pre-construction meeting be held.

.3 All Subcontractors that are affected, such as the concrete, masonry, hollow metal frame, curtain wall, gypsum board/steel stud, mechanical (including their Subcontractors) and electrical (including their Subcontractors) shall be in attendance, along with Firestopping Subcontractor, Contractor, Contract Administrator(s), The City's Representative and Quality Assurance/Design Contract Administrator.

.4 Each Subcontractor shall receive one copy of the Design System Listings Shop Drawings as copied and distributed by the Contractor.

.5 Standard installation procedures shall be reviewed, scheduling / sequencing of other work around or that affects the outcome of the installation, precautions, annular opening sizes, wall/floor service single and multi – preparations, joints and perimeter joints shall be reviewed to ensure that all Subcontractors and the Contractor understand the full complexity of the firestop installation, based on the approved Design System Listings Shop Drawings.

.6 Contractor shall be responsible for taking minutes of this meeting and distributing these minutes to all affected trades.

1.11 MOCK-UPS

.1 After Design System Listings Shop Drawings are reviewed by the Contract Administrator, the Pre-Construction meeting is held and one-week prior to actual commencement of construction, provide field sample mock-up of each proposed ULC or cUL system for this project for Contract Administrator review. This mock-up shall also include if required, Work by other trades, to provide the required finish Work, such as steel stud /gypsum board trade framing out multi-penetrations openings. The Firestop Subcontractor shall provide a minimum of three (3) of the selected mock-ups that are exposed to the room finishes and have mock-up systems primed and painted to match architectural finishes prior to the review, to allow Contract Administrator (Architect) to verify the quality, colour, texture etc. to meet the design intent.

.2 Mock-up locations shall be directed by the Contract Administrator.

.3 Once mock-ups have been completed and materials have had adequate time to properly cure notify the Contract Administrator to perform their review. Minimum 48 hours is required to be given to the Contract Administrator.

.4 Reviewed mock-ups shall become the standards of workmanship and material against which installed Work will be checked. Reviewed and approved mock-ups may be used in final construction.

.5 Install assembly identification penetration / joint plate to each reviewed mock up.

.6 Install fire separation (barrier) marking on one wall (20m long, minimum).

.7 Local or National representation from the manufacturer shall be present during the Contract Administrator mock-up review.

.8 The Contract Administrator shall provide Observation and Destructive Tests to each Mock-Up to ensure the mock-up firestop system meets or exceeds the approved Design System Listing. The Firestop Subcontractor to include for all costs of these mock-ups, including cutting or removing the system to allow for visual review and then the replacement or re-installation of the system.

.9 Upon completion of the review, the National and Local representative shall provide in writing to the Contract Administrator that their review finds the mock-ups acceptable by the manufacturer and meets or exceeds the ULC or cUL design system listing requirements for each mock-up application.

.10 Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed unit of work. Accepted mock-ups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.12 DEFINITIONS

.1 **Firestops**: specially tested materials or combination of materials used to establish or re-establish the integrity of a fire rated wall, floor, ceiling or roof assembly or other partition after the structure has been breached for the through-penetration of building service items or to close off openings left due to construction methods to prevent or limit the spread of fire, heat, gasses and smoke.

.2 **Through-penetration**: opening or foreign material, pipes, conduits, ducts, cable trays, cable, wire, structural components or any other element passing completely through an opening in a fire rated barrier/assembly such that the full thickness of the rated material(s) is breached either in total or in part.

.3 **Membrane penetration**: any penetration (as indicated in 1.12.2) of a fire rated barrier that breaches one side but does not pass completely through to the other side, including recessed electrical devices.

.4 **System**: the combination of specific materials and/or devices, including the penetrating item(s) required to complete the firestop, as tested by an independent third party test facility.

.5 **Barrier/Assembly**: a wall, floor, ceiling or roof assembly or other partition with a fire-smoke rating of 0,1, 2, 3 or up to 4-hours.

.6 **Fire Resistive Joint**: any joint or opening, whether static or dynamic, within or between adjacent sections of fire rated interior or exterior walls, floors, ceilings or roof decks.

.7 **Fireblocking:** Building materials installed to resist the free passage of flame, smoke and noxious gases to other areas of the building through concealed spaces.

.8 **Perimeter Fire Barrier System**: The perimeter joint protection that provides fire resistance to prevent the passage of fire from floor to floor within the building at the opening between the exterior wall assembly and the floor assembly.

.9 **Intumescent**: Materials that expand with that to seal around objects threatened by fire.

.10 **F-Rating**: the time a firestop, penetrating item, building, material, firestop material, can withstand direct flame without a burn through as tested to CAN4-S115-M2005/ULC-S115-M2005 or ASTM E814/UL 1479.

.11 **T-Rating**: the amount of time a through-penetration firestop limits the temperature rise on the cold side-outside the test furnace – as tested to CAN4-S115-M2005/ULC-S115-M2005 or ASTM E814/UL 1479.

.12 **L-Rating Air Leakage Test**: introduced by Underwriters Laboratories on August 9, 2004 for systems tested and listed in accordance with ANSI/UL 1479. Not exceeding 0.01524 cu. m/s per square meter of penetration opening at 74.7Pa at both ambient and elevated temperatures (204$^{o}$ C).

.13 **W-Rating Washout Test**: introduced by UL's, UL1479 Standards Technical Panel, March 17, 2005.

.14 **Non-Rated Fire Separations:** to be a separation that prevents the passage of fire and smoke for time period that allows the fire suppression system to be activated and contain the fire. For the purpose of this project, all Non-Rated Fire Separations as indicated on drawings to be assigned a minimum time of 60-minutes Fire Resistance Rating and shall be fire stopped on both sides of the fire separation.

.15 **Single Penetration**: one service penetration through a fire separation.

.16 **Multi-Penetration**: two or more service penetration through a fire separation where the minimum space between pipes must exceed 50mm and where sizes of pipe are larger than 50mm, the space must be larger than the largest pipe between. (Example, one – 100mm diameter pipe and one – 150mm diameter pipe, the space between pipes must be greater than 150mm or otherwise the penetration will be considered a multi-penetration, when passing through a fire rated gypsum board partition. These gypsum board partitions must be framed out on all four sides with studs to match the ULC Design Wall System and the annular space must be boarded with rated gypsum board to match the ULC Design Wall System.

1.13 DAILY WORK SHEET

.1 Firestop Subcontractor, superintendent shall keep a daily log of all activities on site during the course of construction.

.2 The Contract Administrator shall make periodic reviews of these worksheets during the course of construction.

1.14 AS-BUILTS

.1 Firestop Subcontractor, shall provide as-built drawings, project manual schedules and firestop drawing details on-site and make them available for periodic review by the Contract Administrator.

.2 These drawings, schedules and details shall be marked up on weekly basis showing all alterations, changes and confirmation of each Design Listing in relationship to the project schedules when provided as part of the bid document.

1.15 WARRANTY

.1 Manufacturers shall warrant Work of this Section against defects and deficiencies in the product material for a period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to The City's.

.2 Fire and smoke stop system Contractor hereby warrants workmanship on material installation for period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to The City's.

1.16 MAINTENANCE DATA AND MATERIAL

.1 Provide Operation and Maintenance Data and Material for Fire and Smoke-Stop Systems to incorporate into Manuals, as specified in Section 01 78 00.

.2 Incorporate the following materials in the Operation and Maintenance Manual:

.1 Material Safety Data Sheets (MSDS)

.2 Product literature of each product used on this project.

.3 Approved Design Listings and Engineer Judgements

.4 Matrix schedule indicating all Design Listings and EJs and matching them to the penetration or joint type. Included in this schedule shall be a quantity of each Design Listing/EJ on each floor.

.5 Daily Worksheets.

.6 Certification:
.1 Manufacturer's Certification cards of each installer who installs on this project.
.2 Written proof of FCIA membership.
.3 Written letters from Manufacturer's representative confirming:
.1 Mock-ups
.2 Substantial performance.
.3 Manufacturer's Fire Protection Engineer issues EJ's.
.4 Compliancy of VOC requirements.
.5 Acceptance to having exposed systems primed and painted over.
.7 Warranty:
.1 Manufacturer's warranty
.2 Fire Stop Subcontractor warranty
.8 Life expectancy of each product installed on this project. List date of installation for each product and when the month / year of the expected expiration of each product.
.9 Construction and progress photographs (Section 01 32 00).
.3 Contractors to provide a marked-up as-built to the Contract Administrator eight (8) weeks prior to requesting total performance on the Project.

**PART 2- PRODUCTS**

2.1 MATERIALS
.1 **Firestopping and smoke-seal systems:** in accordance with CAN4-S115-M2005 or ASTM E814.
.1 Asbestos-free materials and systems capable of maintaining an effective barrier against the passage of flame, smoke, water and toxic gases in compliance with requirements of CAN4-S115-M2005 or ASTM E814, and not to exceed opening sizes for which they are intended, in accordance with ULC or cUL Design Numbers or other Design System Listings acceptable to local Authority Having Jurisdiction.
.2 Firestopping materials/systems shall be flexible to allow for movement of building structure (refer to architectural and structural) and penetrating item(s) without affecting the adhesion or integrity of the system.
.2 **Firestop Methods:**
.1 Method 1: non-combustible, semi-rigid, felt; minimum density 65 kg per cu/$m^2$; depth 100 mm, length 1200 mm; width as required. Blanket type fire-stop to be listed, and labelled in accordance with file Guide 40-U19.13. Impale - clips; galvanized wire or 25 mm x 0.65 mm thick galvanized steel Z-clips with dimensions to match location of fire stop material and width of opening being sealed.
.2 Method 2: as per Method 1, without impale - clips.
.3 Method 3: Hose stream UL/cUL (Underwriters Laboratories USA) labelled.
.4 Method 4: Hose stream, fluid, gas and fire resistant elastomeric seal or non-shrink foam cement mortar proprietary certified assembly of a listed manufacturer.
.5 Methods 1 to 4: Methods used can be as per manufacturer's instructions, provided that their system employed meets or exceed the requirements of ULC/CAN4-S115-M2005 or ASTM E814.
.3 **Mechanical or Electrical service**: penetration assemblies; certified in accordance with CAN4-S115-M2005 or ASTM E814 and listed in the ULC Guide No. 40 U19.
.4 **Service - penetration fire-stop components:** Certified in accordance with CAN4-S115-M2005 or ASTM E814 and listed in the ULC Guide No. 40 U19.
.5 **Fire Rated Cable Pathway Devices**: shall be used for ALL low-voltage, video, data and voice cabling, optical fibre raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the drawings. Such devices shall:

.1 Provide ULC or cUL Systems permitting cable loads from; “Zero to 100% Visual Fill.”
.2 Not have a constrictive inner liner that tightens around or compresses cables tightly together encouraging potential cross talk or interference.
.3 Be “Zero-Maintenance”, defined as: No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to the:
.1 Opening or closing of doors.
.2 Spinning rings to open or close inner liner.
.3 Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam blocks, or foam closures of any sport.
.4 Letter from manufacturer certifying compliance with this definition of “Zero-Maintenance”.
.4 Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
.5 Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
.6 Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.

.6 Fire-resistance rating of installed fire-stopping assembly not less than fire-resistance rating of surrounding substrate assembly (floor or wall) in accordance with the NBC.
.7 Fire-stopping and smoke-seals at openings intended for re-entry such as cables; elastomeric seal or non-shrink foam cement mortar: do not use cementitious or rigid seal at such locations.
.8 Firestopping and smoke-seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations.
.9 **Primers:** to manufacturer's recommendation for specific material, substrate, and end-use.
.10 Water (if applicable: portable, clean and free from injurious amounts of deleterious substrates.)
.11 **Damming and back-up materials, supports and anchoring devices:** to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
.12 **Sealants for vertical joints:** non-sagging and having a flame-spread of not more than 25 and a maximum smoke development classification of 100 for walls and 50 for ceilings.
.13 **Assembly identification penetration plate:** all fire/smoke stop systems that are installed are required to be identified by assembly adhesive label over a piece of 0.9mm aluminium metal backer plate; all plates to be adhered to walls/floors by acceptable adhesive to the backside of the plate. Lettering on all plates shall be printed, as follows (Also refer to sample plates Page 18 for single penetrations or joints and Page 19 for grouped penetrations):

.1 Penetration / joint Assembly ID No.: _____
.2 Floor Level: _____
.3 Room No.: _____
.4 Product: _____
.5 ULC or cUL System Design No.: _____
.6 Fire Rating Required: _____ hour(s)
.7 Firestopping Contractor’s Name: _____
.8 Phone No. of Firestopping Contractor: _____
.9 Installer’s Name: _____

.10 Date of Installation: _____

.11 Re-penetrated by:

| | Company | Installer | Date |
|---|---|---|---|
| .1 | _____ | _____ | _____ |
| .2 | _____ | _____ | _____ |
| .3 | _____ | _____ | _____ |
| .4 | _____ | _____ | _____ |

.12 Penetration / joint plate shall state that the fill material around the penetration is a fire stop system and it shall not be disturbed except by authorized personnel.

.14 Fire Separation (Barrier) Markings: All vertical fire separations within ceiling spaces to be identified by continuously painted red, 75mm high stencil along upper wall. Marking to be painted 400mm above finished ceiling unless otherwise indicated. Final location to be determined on-site. Refer to drawings for locations of fire separations and rating required. Each rating shall be indicated every 6000mm O.C. with 75mm high red painted lines in between. Each rating shall be identified as the assigned hourly rating as indicated on the plans.

**Schedule of Fire Separations:**

| | | |
|---|---|---|
| .1 | --- N/R--- | **Non-rated fire separation** |
| .2 | ---3/4--- | **¾ hour fire separation** |
| .3 | ---1.0--- | **1 hour fire separation** |
| .4 | ---1.5--- | **1.5 hour fire separation** |
| .5 | ---2.0--- | **2 hour fire separation** |

2.2 PRODUCT SYSTEMS

.1 Single source responsibility: obtain firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

.1 Materials of different manufacturers shall not be intermixed on the project, unless the design listing for existing conditions on the Project cannot be found utilizing the Prime Manufacturer. In lieu of providing an Engineer Judgment, the Firestop Sub-trade must research all other manufacturers to provide a design listing for this condition that has been tested. If a tested system is found by utilizing a different Manufacturer, the system and the product shall be used to suit the condition on-site. Subcontractor to avoid overlapping of other products directly onto main firestopping material.

.2 Acceptable Firestop Manufacturers:

.1 AD Fire Protection Systems Inc. as distributed by:
Anchor Construction Industrial Products Ltd.
108 Parklane Avenue, Winnipeg, Manitoba R2R 0K2
Phone: (204) 633-0064

.2 Hilti Fire Stop Systems as distributed by:
925 King Edward Street, Winnipeg, Manitoba R3H 0P8
Phone: 1-800-363-4458 or (204) 930-0173

.3 Rectorseal, Biofireshield or Meta Caulk as distributed by:
Canadian Thermal Technologies
44 Higgins Avenue, Winnipeg, Manitoba R3B 0A5
Phone: (204) 943-5622

.4 STI, Specified Technologies Inc., Spec Seal Firestop Products, as distributed by:
Alsip's Industrial Products Ltd.
1 Cole Avenue

Winnipeg, Manitoba R2L 1J3
Phone: (204) 667-3330 x238

2.3 ACCEPTABLE FIRE RATED CABLE PATHWAY DEVICE MANUFACTURER
.1 Specified Technologies Inc. (STI) EZ-Path™ Fire Rated Pathway

2.4 ACCEPTABLE FIRE STOP APPLICATORS
.1 National Firestop Ltd.
405 Gunn Road, PO Box 16 Grp 514 RR5
Winnipeg, Manitoba R2C 2Z2
Phone: (204) 777-0100
.2 Total Fire Stop Systems Limited
Box 464
Stony Mountain, Manitoba R0C 3A0
Phone: (204) 344-5696
.3 Western Construction Services Ltd.
300 Dawson Road N., Winnipeg, Manitoba R2J 0S7
Phone: (204) 956-9475
.4 Secure Firestop
B-580 Dobbie Avenue,
Winnipeg, Manitoba R2K 1G4
Phone: (204) 667-8859
.5 Adler Firestopping Ltd.
#23, 53016 Hwy 60
Acheson, Alberta T7X 5A7
Phone: (780) 962-9495
.6 Western Canadian Firestopping & Solutions
138 – 740 Dufferin Avenue
Winnipeg, Manitoba R2W 2Z6
Phone: (204) 943-5622

**PART 3- EXECUTION**

3.1 EXAMINATION
.1 Verify substrate conditions, previously installed are acceptable for product installation in accordance with manufacturer's instructions and approved design system listings for each condition.
.2 Ensure that opening / annular space does not exceed the maximum and minimum size or dimensions that is indicated on the approved Design Listing.
.3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on Approved Design Listings. All temporary lines and markings have been removed to meet the approved Design System Listings for each condition has been identified.
.4 Verify that the proposed Firestopping system is composed of components that are compatible with each other, the substrates forming the openings, and the items, if any, penetrating the firestopping under conditions of application and service, as demonstrated by firestopping manufacturer based on testing and field experience.
.5 Ensure no additional items have been installed through opening that does not appear on the approved Design Listing.
.6 Ensure areas that are to be firestopped are accessible for proper application and conditions are suitable for installation of a firestop system. All areas must also be accessible for inspection.
.7 Report in writing to the Contract Administrator any defective surfaces or conditions affecting the firestop system installation, immediately and prior to commencing any installations.

.8 Proceed only when defected surfaces or conditions have been corrected.
.9 Ensure temperature within the areas of installation meets or exceeds the minimum temperature range for the products that will be installed in those areas, as based on the manufacturer's recommendations for a minimum two days prior and three days after installation.
.10 Beginning of installation means acceptance of site conditions.

3.2 PREPARATION
.1 Protect adjacent Work areas and finish surfaces from damage during product installation.
.2 Provide drop sheets or other satisfactory coverings for protection of adjacent areas in accordance with safe and good work practices.
.3 In areas to be fire stopped ensure that substrate and service penetrations are clean, dry and frost free.
.4 Use masking tape to prevent firestopping from contacting adjoining surfaces that will be exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.
.5 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.6 Prepare surfaces in contact with firestopping materials and smoke-seals to manufacturer's instructions.
.7 Maintain insulation around pipes and ducts penetrating fire separation. Confirm that fire stop system has been tested with actual pipe or duct insulation penetrating fire separation that is indicated in the approved ULC or cUL Design System Listing.
.8 Surfaces to which firestop materials are to be installed, shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
.9 Ensure that multi-penetration openings have been framed and boarded out, all around the annular opening, prior to prepping the opening.
.10 Confirm that the temperature and humidity conditions during and after installation are being maintained as per manufacturers' recommendations.

3.3 INSTALLATION
.1 Install firestopping and smoke-seal material and components in accordance with manufacturer's instructions and rated system as tested to ULC/CAN4-S115-M2005, and ULC or cUL Design System Listings.
.2 Coordinate with other Subcontractors to assure that all pipes, conduit, cable, and other items, which penetrate fire separations have been permanently installed prior to installation of firestop systems. All hangers, clamps, holding devices, etc. have been installed, leveled and completed by other trades prior to installing firestop systems.
.3 Schedule the Work to assure that fire separations and all other construction that conceals penetrations are not erected prior to the installation of fire and smoke stop systems.
.4 Seal holes or voids made by through-penetrations, poke-through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire-separation are maintained.
.5 Provide temporary forming as required. Remove forming material only after firestop system has gained sufficient strength and after initial curing as per manufacturer's instructions.
.6 Tool or trowel exposed surface to a neat finish.
.7 Remove excess compound promptly as Work progresses and upon completion.
.8 Refer to Mechanical and Electrical Sections and drawings for further information.
.9 Seal all voids between new fire rated wall assemblies and new or existing building walls to form a draft-tight barrier and act to retard the passage of flame, toxic gases and smoke.
.10 Install firestop material to obtain fire resistance rating not less than the fire resistance rating of surrounding floor and wall assembly.

3.4 SCHEDULE OF FIRESTOP LOCATIONS

.1 Fire stop and smoke-seal includes but not limited, to the following locations:
- .1 Provide appropriate Firestop System when exposed to view, architectural finish, traffic, moisture, heat, movement and physical damage.
- .2 Penetrations through fire-resistance-rated new or existing masonry, concrete, and gypsum board partitions/walls, floors and roof assemblies.
- .3 Intersection of fire-resistance-rated new or existing masonry, concrete and gypsum board partitions.
- .4 Joints at top and bottom of fire resistance rated new or existing concrete masonry and gypsum board partitions. Joints to allow for independent movement.
- .5 Control and sway joints in fire-resistance-rated new or existing masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance-rated floor slabs/systems, ceilings and roof.
- .7 Openings and sleeves installed for future use through fire separations and unused openings and sleeves constructed as part of work.
- .8 Around mechanical and electrical assemblies/devices penetrating fire separations.
- .9 Between edge of fire-resistant floor or roof assemblies and exterior wall assemblies.
- .10 Between floors, walls, ceilings and roof assemblies at horizontal and vertical fire resistant ratings at floor expansion joints.
- .11 Rigid ducts: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
- .12 Mechanical and electrical recessed boxes in walls and partitions.
- .13 Where indicated on drawing and specification documents.
- .14 Cables entering into a fire-rated pass-thru device at fire-rated walls and floor assemblies at end of cable trays or otherwise indicated on electrical drawings and specifications.
- .15 The continuous joint between the marriage of the fire-rated wall and floor assemblies to the:
  - .1 Mechanical fire-rated duct wrap
  - .2 Mechanical Stand-By Generator muffler and exhaust pipe (calcium silicate pipe and block insulation) (refer to Section 15180, Item No. 3.9.1).

## 3.5 INSTALLING FIRESTOP JOINT SYSTEMS

.1 Install joint fillers to provide support of firestop materials during application and at the position required to provide the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

.2 Install systems by proven techniques that result in firestop materials as recommended by the manufacturer:
- .1 directly containing and fully wetting joint substrates.
- .2 completely filling recesses provided for each joint configuration,
- .3 providing uniform, cross-sectional shapes and depths relative to joint width that optimizes movement capability.
- .4 Tool non-sag firestop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to:
  - .1 produce fire-resistance rating
  - .2 to eliminate air pockets
  - .3 to ensure contact and adhesion with sides of joint.

## 3.6 INSTALLATION OF ASSEMBLY IDENTIFICATION PENETRATION PLATE

.1 Install adjacent to all through wall/floor service penetrations / joints that are firestopped and at joint penetrations. Provide one assembly identification plate per penetration opening and one assembly identification plate at every 6000mm along wall/floor joints.
.2 Penetration / joint plate shall be completely filled out and installed prior to requesting substantial performance.
.3 Clean substrate prior to applying penetration / joint plate.
.4 Securely apply penetration / joint plate to substrate, by providing adequate adhesive.
.5 Install all plates 50mm away from penetration or joint. Refer to details on Pages 18 -20 of this Section.

3.7 INSTALLATION OF FIRE SEPARATION (BARRIER) MARKINGS
.1 Install/paint barrier markings parallel with ceiling, in accordance with ULC or cUL requirements.

3.8 REPAIRS AND MODIFICATIONS
.1 Identify damaged or re-entered seals requiring repair or modification.
.2 Remove loose or damaged materials. If penetrating items are to be added, remove sufficient material to insert new elements. Cause no damage to the balance of the seal.
.3 Ensure that surfaces to be sealed are clean and dry. Install materials in accordance with manufacturers specified installation and repair requirements ~~herein~~. Use only materials approved by manufacturer as suitable for repair of original seal. Do not mix different manufacturer's products.

3.9 MANUFACTURER'S FIELD QUALITY
.1 Representative from Manufacturer shall perform periodic observations of firestopping systems:
.1 Examine firestop penetration seals for proper installation, labelling, adhesion and curing as may be appropriate for the respective seal material.
.2 Keep areas of Work accessible and notify Contract Administrator, code authorities and/or designated inspectors, when Work is ready for eview.
.3 Document completion and observation as required.

3.10 CONTRACT ADMINISTRATOR REVIEW
.1 The Contract Administrator shall review all submitted Design System Listings (shop drawings) prior to start up meeting (Refer to item No. 1.7)
.2 The Contract Administrator to provide an agenda for a start up meeting, will chair the meeting, record meeting minutes and distribute. (Refer to item No. 1.10)
.3 The Contract Administrator shall perform mock-up reviews as indicated in Item No. 1.11.
.4 The Contract Administrator shall provide random General Reviews during the course of the project.
.5 Contract Administrators shall be called to perform random Observation Reviews during the course of construction and prior to closing off any concealed areas. These observations shall be based on ASTM E2174 Standard Practice for on-site inspection of Installed Firestop Systems and ASTM E2393 Standard practice for on-site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers. Contractor shall notify Contract Administrator minimum of 72-hours prior to requesting review.
.6 Firestopping Subcontractor shall include for a minimum of 10% Observation Review of each Design Listing for each area of 900m2 (based on ASTM E2174). Perimeter Joints shall have a minimum 10% Observation Reviews of each Design Listing (based on ASTM E2393). Bottom and top of wall joints, wall to wall joints and building expansion joints shall have a minimum 10% Observation Reviews of each Design Listing.
.7 The Contract Administrator shall perform Exploratory Reviews (Destructive Test) based on ASTM E2174, and E2393 during the course of construction where the system will be cut out by the Firestopping Subcontractor as directed by the Contract Administrator and

removed to ensure the firestop system installed meets or exceeds the Design System Listing as identified. (Subcontractor to include these costs in their base bid.)

.8 Firestopping Subcontractor shall include for a minimum of 2% Exploratory Review of each Design Listing for each area of 900m2 (based on ASTM E2174) for such exploratory reviews per approved Design System Listings. Perimeter Joints shall have a minimum cut test every 15 meters (based on ASTM E2393). Bottom and top of wall joints, wall to wall joints and building expansion joints shall have a minimum Exploratory Review every 15 meters.

.9 The Firestopping Subcontractor shall do all cutting and removal of the systems during mock-up and exploratory reviews for visual review and size determination (thickness, depth and/or width of the system) from the Contract Administrator and local manufacturer's Representative. Once the review is completed and accepted, the Firestopping Subcontractor shall replace the firestop system with new. All costs for cutting, removing and replacement shall be included in base bid.

.10 The Contract Administrator shall perform random reviews of the Firestop Subcontractor's General Performance during their visits, such as:

.1 Daily worksheet (construction progress).
.2 Construction photographs.
.3 Product storage, handling and delivery.
.4 As-built schedules and drawings.
.5 Penetration / Joint plate installation.
.6 Barrier marking installation
.7 Protection of installed systems.

.11 All Exploratory Reviews (cut tests) must meet the Design Listed Systems minimum thickness, depth and/or widths of the annular requirements. No shrinkage of the product installation will be allowed.

.12 All noted items indicated in firestop reviews must be reviewed by the Firestop Subcontractor(s) and responded by written letter back to the Contract Administrator on the direction the Firestop Subcontractor has or will be taking:

.1 Start-up Meetings.
.2 General Meetings.
.3 Design Listing (Shop Drawing) Review.
.4 Mock-Up Reviews.
.5 General Reviews.
.6 Product Reviews.
.7 Observation Reviews.
.8 Destructive Reviews.
.9 Substantial Performance Reviews.

.13 All scheduled reviews shall be performed by the Contract Administrator as indicated and agreed to by the Firestop Subcontractor(s) and can only be cancelled a minimum of 72-hours prior to the review. All other cancellations less than 72-hours shall be back-charged.

3.10 IDENTIFICATION AND DOCUMENTATION

.1 The firestop installer shall document each single application addressed and identify each penetration and joint location on the entire project.

.2 The Documentation Form for through penetrations shall include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the penetrations location
5. Tested System or Engineered Judgment Number
6. Type of assembly penetrated
7. A detailed description of the size and type of penetrating item
8. Size of opening
9. Number of sides of assemblies addressed

10. Hourly rating to be achieved
11. Installers Name

.3 The Documentation Form for Construction Joints shall include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the Construction Joints location
5. Tested System or Engineered Judgment Number
6. Type of Construction Joint
7. The Width of the Joint
8. The Lineal Footage of the Joint
9. Number of sides addressed
10. Hourly rating to be achieved
11. Installers Name

.4 Copies of this documentation shall be provided to the Contractorr at the Substantial Performance of the project.

.5 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Subcontractor's Name, address, and phone number.
3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
4. Date of Installation.
5. Through-Penetration firestop system manufacturer's name.
6. Installer's Name.

3.11 CLEAN-UP

.1 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning materials approved by Manufacturer.

.2 Protect firestopping during and after curing period from contact with contaminating substances. If damage caused by others, the Contractor shall instruct the Firestop Subcontractor to make appropriate repairs and to charge to appropriate parties.

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

**END OF SECTION**

## PART 1 GENERAL

1.1 REFERENCES, latest edition.

.1 CAN/CGSB-19.1-M, Putty, Linseed Oil Type

.2 CAN/CGSB-19.2-M, Glazing Compound, Nonhardening, Modified Oil Type

.3 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing

.4 CAN/CGSB-19.6-M, Caulking Compound, Oil Base

.5 CAN/CGSB-19.13-M, Sealing Compound, One-component, Elastomeric, Chemical Curing

.6 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-polyisobutylene Polymer Base, Solvent Curing

.7 CAN/CGSB-19.17-M, One-Component Acrylic Emulsion Base Sealing Compound

.8 CAN/CGSB-19.18-M, Sealing Compound, One Component, Silicone Base, Solvent Curing

.9 CAN/CGSB-19.21-M, Sealing and Bedding Compound Acoustical

.10 CAN/CGSB-19.22-M, Mildew Resistant, Sealing Compound for Tubs and Tiles

.11 CAN/CGSB-19.24-M, Multi-component, Chemical Curing Sealing Compound

.12 LEED Canada NC-1.0, credit “Indoor Air Quality – Credit 4.4 – Low Emitting Materials”

.13 California South Cost Air Quality Management District Rule #1168 – Adhesive and Sealant Applications

1.2 SUBMITTALS

.1 Submit Material Safety Data Sheets (MSDS) to meet LEED requirements as per Section 01 47 15 and Section 01 33 00, for review and approval by the Contract Administrator.

.2 Provide a sticker at each fire-rated assembly on site and submit a binder with complete list of joint sealer assemblies with coordinated site-applied stickers.

.3 Upon request, submit samples in accordance with Section 01 33 00.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00.

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

1.4 ENVIRONMENTAL AND SAFETY REQUIREMENTS

.1 Comply with Workplace Hazardous Materials Information System (WHMIS) requirements for use, handling, storage, disposal of hazardous materials and with Labour Canada requirements for labelling and provision of material safety data sheets.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

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

.4 Place used hazardous sealant tubes and other containers in areas designated for hazardous materials.

**PART 2 PRODUCTS**

2.1 SEALANT MATERIALS

.1 Sealants and caulking compounds must meet VOC limits set out by the SCAQMD as per Section 01 47 15, and:

.1 Meet or exceed all applicable government and industrial safety and performance standards, and

.2 Be manufactured and transported such that the whole process, including disposal of related waste products, will meet all applicable government regulations and by-laws, including the Fisheries Act and the Canadian Environmental Protection Act (CEPA).

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

.3 Sealant and caulking compounds must be accompanied by detailed instructions for proper application and proper disposal methods, to minimize health concerns and maximize performance.

.4 Caulking that emits strong odours, contains toxic chemicals, or is not certified as mould resistant, shall not be used in air handling units.

.5 When low toxicity caulking is not possible, confine use to areas, which: off-gas to the exterior, occur beyond the exterior face of the air barrier envelope, or are applied several months before occupancy to maximize the potential off-gas time.

.6 Preference will be given to sealants with the following characteristics: non-flammable, low Volatile Organic Compound (VOC) content, manufactured without compounds which contribute to ozone depletion in the upper atmosphere, and not containing methylene chloride or chlorinated hydrocarbons.

.7 Except for CAN/CGSB-19.1 and CAN/CGSB-19.18, acceptable sealants must be listed on the Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers, use only these primers.

.8 Contract Administrator will review sealant colours to match as close as possible to adjacent surfaces.

2.2 SEALANT MATERIAL DESIGNATIONS (for general compliance)

| | Type | Reference | Description | Application | Acceptable Product |
|---|---|---|---|---|---|
| 1 | Neoprene or Butyl Rubber. | | Round solid rod, Shore A hardness 70 | | |
| 2 | High Density Foam Backer Rod. | | Extruded closed cell polyvinyl chloride (PVC), extruded closed cell polyethylene, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer. Size to suit gaps. | | |
| 3 | Spray Foam Insulation | | Low-expanding closed cell foam insulation | At shim spaces around window/door frames to maintain continuity of thermal barrier and to be compatible with adjacent surfaces. | |
| 4 | Bond Breaker Tape | | Polyethylene bond breaker tape (non-bonding to sealant) | | |
| 5 | Polyurethane Sealant. | CAN 19.13-M | Single component, high performance, non-sagging, low modulus, non-staining | At all exterior and interior control / expansion joints and on exterior side perimeter of all window / door frames. | Tremco Dymonic or Sonolastic NP1 |
| 6 | Latex Sealant. | CGSB 19-GP-17M | Single component, non-sagging, non-staining. | On interior side perimeter of all exterior window / door frames and all interior window / door frames. | Tremco Spectrum 2 |
| 7 | Silicone Sealant. | CGSB 19-GP-9M | Single component, fungus resistant, non-sagging, non-staining, non-bleeding, moisture curing. | Joints at all sloped glazing, skylights, and joints between vanities, countertops, backsplashes and adjacent wall materials, and joints between bathtubs, walls, floors, and adjacent finishes. | Tremco Proglaze or GE Sanitary SCS 1700 |
| 8 | Siliconized acrylic latex sealant | | Single component, pure acrylic latex, fast-setting with minimal shrinkage, white colour | At exposed joints between hollow core slabs to 1/4” maximum width. | Tremco Tremflex 834 . |
| 9 | Acoustical Sealant | CAN/CGSB 19.21 M | Single component, non-skinning, non-hardening synthetic rubber sealant, sound dampening sealant, grey colour | For acoustical sealing of drywall partitions, corridors and party walls, and at inside of exterior walls for vapour barrier to stud wall framing. | Tremco Acoustical Sealant . |

2.3 JOINT CLEANER

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

.2 Primer: as recommended by manufacturer.

**PART 3 EXECUTION**

3.1 PROTECTION

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

3.2 PREPARATION OF JOINT SURFACES

.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**