

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 16 - Batt insulation.
- .2 Section 20 07 00 - Thermal Insulation for Piping.

### **1.2 REFERENCES**

- .1 ASTM International (ASTM).
  - .1 ASTM C612-14, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .2 ASTM C1325-08b, Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
- .2 Canadian General Standards Board (CGSB).
  - .1 CGSB 71-GP-24M+Amdt-Nov-83, Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.
- .3 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3 CAN/ULC S702-09, Standard for Mineral Fibre Thermal Insulation for Buildings.

## **Part 2 - Products**

### **2.1 RIGID INSULATION**

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

## **Part 3 - Execution**

### **3.1 WORKMANSHIP**

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Fit insulation tight around obstructions and protrusions.
- .3 Do not enclose or cover insulation until it has been inspected and approved by Departmental Representative.

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 - Board Insulation.
- .2 Section 20 07 00 - Thermal Insulation for Piping.

### **1.2 REFERENCE STANDARDS**

- .1 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S702-2014, Standard for Mineral Fibre Thermal Insulation for Buildings.

## **Part 2 - Products**

### **2.1 INSULATION**

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

## **Part 3 - Execution**

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

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

### **3.2 INSULATION INSTALLATION**

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Fit insulation closely around objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Do not enclose insulation until it has been reviewed by Departmental Representative.

### **3.3 CLEANING**

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

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 73 00 - Execution
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 02 41 19 - Selective Demolition, Cutting and Patching
- .6 Section 06 10 53 - Miscellaneous Rough Carpentry
- .7 Section 07 62 00 - Sheet Metal Flashing and Trim
- .8 Section 07 72 00 - Roof Accessories

### **1.2 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA)
  - .1 Canadian Standards Association (CSA International).
  - .2 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
  - .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  - .4 CSA 0118.1-97(R2002), Western Cedars Shakes and Shingles.
  - .5 CAN/CSA-G164-M92(R2003), Hot Dip
  - .6 Galvanizing of Irregularly Shaped Articles.
  - .7 CAN/CSA-O141-05, Softwood Lumber.
  - .8 CSA O151-04, Canadian Softwood Lumber.
  - .9 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber. March 1, 2007 issue.
- .2 Cedar Shake and Shingle Bureau (CSSB).
  - .1 CSSB-97, Cedar Shake and Shingle Grading Rules.
  - .2 CSSB New Roof Construction Manual for Roof Application Details 2002.

### **1.3 QUALITY ASSURANCE**

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood in accordance with CSA and ANSI standards.

### **1.4 SUBMITTALS**

- .1 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit duplicate full-size shingles, of finish and profile specified.
  - .3 Submit samples of all types of underlayment and screens.
  - .4 Submit samples of all coatings (shingle stains and wood paint).

### **1.5 MOCK UPS**

- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Construct portion of shingling showing underlayment, repetitive pattern, weather exposure, built-in flashings, fitting, dressing and nailing.
- .3 Construct portion of shingling including roof peak, showing shingling and nailing.

- .4 Construct mock-up for each flashing detail for chimney and valley/dormer connections for approval prior to implementing work.
- .5 Advise Departmental Representative minimum three (3) working days prior to constructing mock-ups.
- .6 Allow 48 hours after completing mock-up for inspection of mock-up before proceeding with work.
- .7 When accepted, mock-up will demonstrate minimum standard of quality require for this work. Approved mock-up may remain as part of finished work.

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

- .1 Packing, Shipping, Handling and Unloading:
  - .1 Deliver, handle, store and protect materials as to prevent damage.
  - .2 Remove only in quantities required for same day use.
- .2 Storage and Protection:
  - .1 Provide and maintain dry, off-ground weatherproof storage.
  - .2 Cover top of piles to keep out rain and prevent over-drying of bundles or loose shingles in top layer.
- .3 Pre-Installation Preparation:
  - .1 Shingles must reach hygroscopic equilibrium with ambient air prior to installation. Store shingles outside, out of direct sunlight and rain, for a minimum of seven (7) days for hygroscopic equilibrium to occur.

## **1.7 WASTE MANAGEMENT & DISPOSAL**

- .1 Minimize waste and separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

## **1.8 UN-USED MATERIALS**

- .1 Unused shingles remain property of Owner.
- .2 Return unused shingles to Owner. Retain packaging or rewrap shingles to form complete bundles.
- .3 Label packages to identify product, quantity and manufacturer/supplier.
- .4 Deliver and store in location designated by Departmental Representative.

## **Part 2 - Products**

### **2.1 MATERIALS**

- .1 Circular Sawn Shingles.
  - .1 Species: Western Red Cedar.
  - .2 Grade: #1 Blue Label.
  - .3 Profiles: 1.6 mm at point, minimum 9.5 mm at butt end.
  - .4 Widths: Random widths, 100 mm minimum, 350 mm maximum,
  - .5 Lengths: 457 mm.
  - .6 Grain: edge grain.
  - .7 Wood: 100% heartwood, clear from bottom 280 mm, free from excessive grain sweeps or cross grain.
- .2 Underlayment:
  - .1 Self-adhesive underlayment: self-adhered composite membrane consisting of a high softening point, SBS rubberized asphalt compound integrally laminated to a

- cross-laminated polyethylene film with Self-adhesive underlayment:(Cont'd) anti-slip coating. Blueskin PE 200 HT by Bakor, or approved equal.
- .2 Primer for metal and masonry surfaces: Aquatic Primer by Bakor or approved equal.
- .3 Sealing Compound, Polybitume 570-05 by Bakor or approved equal.
- .3 Flashing:
  - .1 Chimney: lead sheet, free of inclusions, laminations and other defects; weight: base flashings 19.6 kg/m<sup>2</sup> (4 lbs/ft<sup>2</sup>), cap flashings 24.4 kg/m<sup>2</sup> (5 lbs/ft<sup>2</sup>); maximum length on installation: 1000 mm.
  - .2 Patination Oil: available in 1 and 2.5 litre cans, coverage approximately 60 m<sup>2</sup>/litre.
  - .3 Bituminous Paint: compatible with lead, for coating lead to be in direct contact with mortar.
  - .4 Bond breaker tape: masking tape or approved equal to prevent mortar bond to lead flashing at one side of joint.
  - .5 Fasteners for lead: Clips to be lead coated copper, 24 ounce. Fastening screws for clips to be stainless steel.
  - .6 Valleys and Dormers: center-crimped, painted, galvanized steel or aluminum; weight: flashing to be 0.45 mm (28 gauge), non-staining, non-corrosive metal; maximum length of sections 2440 mm with minimum 152 mm overlap at joints.
- .4 Wire Nails:
  - .1 Shingle and Common, 14 gauge, hot-dipped zinc coated to CSA B111 1974 R2003. Length: sufficient to penetrate 19 mm into roof sheathing, but not penetrate through underside of sheathing. Staples are not acceptable fasteners for this Work.
  - .2 Exposed shingle nails: oval-headed siding nails, hot-dipped galvanized, length as in clause 4.1 above.
- .5 Sheathing Boards:
  - .1 Eastern White Pine, No.1 grade, dressed 4 sides, kiln dried, moisture content 19% or less, thickness to match existing.
- .6 Ventilated Underlayment:
  - .1 Per the requirements of Section 07 72 00 Roof Accessories.
- .7 Eave Fascia and Gable Trim:
  - .1 Dimensions, profile and wood species to match existing removed. Finish with exterior linseed oil paint per the requirements of Section 09 03 61 and Section 09 91 23. Colour to match existing or acceptable equivalent with approval of Departmental Representative.
- .8 Gable Trim:
  - .1 Moulding width to cover gap between top of gable fascia and underside of shingle overhang. Dimensions, profile and wood species to match existing removed. Finish with exterior linseed oil paint per the requirements of Section 09 03 61 and Section 09 91 23. Colour to match existing or acceptable equivalent with approval of Departmental Representative.
- .9 Wood Shingle Finish:
  - .1 undercoat "Sansin SDF" clear base and two-coat wood finish "Sansin ENS", pigmented in exterior saturated colour "Forest Green 68" or acceptable equivalent with approval of Departmental Representative.
- .10 Pressure preservative treatment: to CSA O118.1, Appendix F.
- .11 Insect screen: PVC coated fibreglass yarn, black.

## **Part 3 - Execution**

### **3.1 REMOVALS**

- .1 Carefully remove existing vent stack collars and save for reinstatement.
- .2 Remove existing roofing, flashings and underlay, and expose sheathing of roof.
- .3 Withdraw existing shingle and flashing nails, set those which break off. Leave surfaces free from dirt and loose material.
- .4 Departmental Representative to inspect roof sheathing. Take up, cut out and remove portions of sheathing boards affected by fungal or insect attack. Remove existing fascia board at eaves.
- .5 Replace cut out portions of sheathing boards with boards of equal sectional dimensions, and specified grade. Seat each end of board on rafter, with 25 mm bearing, and secure to rafter with nails.

### **3.2 INSTALLATION OF CHIMNEY COLLAR**

- .1 Install galvanized steel collar at chimney to support vertical upturn of self-adhesive underlayment, as shown on Drawings.
- .2 Prime collar as per manufacturer's instructions, prior to installation of self-adhesive underlayment.

### **3.3 UNDERLAYMENT**

- .1 Install building paper over existing roof deck prior to installing vertical and horizontal battens as detailed in Drawings
- .2 Install insect screening at eave edge of roof prior to attaching vertical battens. Wrap screen over horizontal batten edge and attach to block eave vent openings as shown on Drawings.
- .3 Install self-adhesive underlayment over horizontal battens at eaves, hips, dormer, peak and chimney as shown on Drawings. Install with minimum overlap 150 mm at edges and laps. Prime metal and masonry surfaces prior to installation of self-adhesive underlayment.
  - .1 Install one full roll width (914 mm) of self-adhesive underlayment on top of horizontal strapping at eaves, as eave protection. Keep edge 25 mm back from edge of strapping board at eaves to conceal.
  - .2 Install one full roll width (914 mm) of self-adhesive underlayment at gable edges.
  - .3 Install one full roll width (914 mm) of self-adhesive underlayment in valleys with half of roll width each side of valley.
  - .4 Install one full roll width (914 mm) of self-adhesive underlayment on each side of roof peaks and dormer peak.

### **3.4 INSTALLATION OF FLASHINGS**

- .1 Valleys
  - .1 Install new valley flashing over self-adhesive underlayment at roof valleys.
    - .1 Flashing sections to be at least 610 mm in width and a maximum of 2440 mm in length and on installation shall overlap a minimum of 152 mm.
    - .2 Flashing shall extend a minimum of 200 mm of under the adjacent shingles with an open valley width of approximately 203 mm.
    - .3 Flashing sections shall be attached using a minimum of fasteners to hold each section in place.
- .2 Chimney

- .1 Base
  - .1 Flashings shall be at least 100 mm high and shall project at least 100 mm on to roof, or greater where shown on Drawings.
  - .2 On sloped intersections sheets shall be lapped 75 mm minimum.
  - .3 When run horizontally sheets shall be lapped a minimum 100 mm.
- .2 Cap Flashing or Counter Flashings:
  - .1 Extend flashings 50 mm under top course of shingles at sides of chimney.
  - .2 Apron flashing to extend over one full course of shingles below, and lower edge to be secured with metal clips, as shown on Drawings.
  - .3 Reglet: insert chimney cap flashing not less than 30 mm into existing, reused mortar joints with lead plugs 25 mm wide and maximum 300 mm apart, minimum two plugs per length of flashing.
- .3 Bituminous Paint, for Lead Flashings:
  - .1 All lead flashings to be in contact with mortar to be coated with thick coat of bituminous paint prior to installation, in areas where required to prevent direct mortar contact.
- .4 Patination Oil, (for Lead flashings):
  - .1 Shake can vigorously before use.
  - .2 Coat full underside of lead prior to installation.
  - .3 Coat exposed surfaces before turning clips around edges. Coat clips.
  - .4 Coat between laps and adjoining sheets.
  - .5 Rub in well with soft, lint-free cloth.
  - .6 Do not use linseed oil as an alternative to Patination Oil.

### 3.5 APPLICATION

- .1 Do wood shingle work in accordance with National Building Code except where indicated otherwise.
- .2 Install shingles over dry substrate.
- .3 Space shingles approximately 6 mm apart.
- .4 Stagger joints minimum of 40 mm in succeeding courses. Ensure that in any 3 courses no two joints are in alignment.
- .5 Nailing:
  - .1 For concealed nailing, use two nails per shingle. Space nails 20 mm from edge with additional nails 100 mm apart across face of shingle, and 40 mm above butt line of following course.
  - .2 Drive nails flush but do not crush shingles.
  - .3 For exposed nailing, use oval-headed siding nails, galvanized.

### 3.6 SHINGLE ROOFING

- .1 Starter Course:
  - .1 Double shingles at eaves with butts projecting 50 mm beyond first roof sheathing boards and minimum of 19 mm beyond eave moulding trim at gable ends.
- .2 Coursing Pattern:
  - .1 Coursing pattern to have double shingles every third course for all roof areas.
- .3 Typical course:
  - .1 Install shingles with approximately 127 mm weather exposure and having triple thickness of shingle at any given point. Contractor to verify and replicate weather exposure spacing of existing shingles. Adjust course to align with lower edge of chimney.
  - .2 Lay shingles with grain perpendicular to eaves.

- .3 Avoid lining up joints with centre line of hearts and do not break a joint below centre line of hearts.
- .4 Keep shingles 25 mm clear of any vertical flashing.
- .4 Finishing the Roof Peak:
  - .1 Stop building paper, plywood strapping and board strapping short of roof deck peak such that there is a horizontal gap of 50 mm as shown on Drawings, for ventilation.
  - .2 Install prefabricated cedar ridge vent as per manufacturer's instructions.
  - .3 Selection of ridge vent product with approval of Departmental Representative.
  - .4 Install prefabricated taper-sawn ridge cap over ridge vent or fabricate a ridge cap using existing shingle supply to install over ridge vent. See Drawings for installation configuration.
- .5 Finishing the Eaves/Fascia:
  - .1 Attach new fascia to exterior rafter tails and paint to finish. Existing soffit and trims to remain in place.
  - .2 Dimensions and profile of new fascia trims to match existing removed.

### **3.7 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .2 Remove roofing nails that have fallen on ground using high powered, earth magnets or other collection devices. Nail pickup to Departmental Representative's approval.

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 08 80 00 - Glazing.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International (ASTM).
  - .1 ASTM E84-17a, Standard Test Method for Surface Burning Characteristics of Building Materials.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data:
  - .1 Provide manufacturer's printed product data indicating material, thickness, colours, and properties.
- .3 Shop drawings:
  - .1 Indicate thickness, dimensions, layout, details at openings and change in plane and anchor details.
- .4 Samples:
  - .1 Submit duplicate 200 mm x 200 mm samples of each colour.
- .5 Mock-Ups:
  - .1 Construct mock-up of plastic glazing clad partition for review and approval by Department Representative.
  - .2 Approve mock-up may remain as part of the work.

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

- .1 Transport and store panels on flat, clean, sturdy surfaces, of same size or larger than panels.
- .2 Store indoors in a dry, dark and well-ventilated area, with no exposure to sunlight, wind, dirt, or hard objects.
- .3 Place on a soft material, such as cardboard, to prevent damage.
- .4 Supported, sloped stacking is recommended. If stacked flat, stack to a maximum height of 900 mm.
- .5 If storage outdoors is unavoidable:
- .6 Cover with opaque material that provides protection from sun. Do not use materials that collect heat or are good heat conductors (e.g. dark objects, steel sheets etc.), as they may collect and deliver excess heat, and damage the sheets.
- .7 Do not store sheets under flexible PVC coverings or other material that may bond to or interact with the panels.
- .8 Extended exposure to direct sunlight may cause heat buildup, softening protective film, fusing it to sheet face, making removal difficult or impossible.
- .9 Wear protective glasses or goggles and a mask which covers the face and mouth when cutting or drilling panels.

## Part 2 - Products

### 2.1 MATERIALS

- .1 Multi-wall Polycarbonate Panels: translucent polygala polycarbonate, standard grade having UL protection on one (1) side only.
  - .1 Triple-wall panels: 16 mm thick, with properties as follows:
    - .1 Fire rating (ASTM E84): Class A.
    - .2 Weight: 2.7 kg/m<sup>2</sup>.
  - .2 Panel size: 1220 mm or 1830 mm wide x maximum practical length.
  - .3 Standard of Acceptance: Plazit Polygal Standard Grade Multi-Wall Polycarbonate (16mm thickness) approved equivalent.
- .2 Trim: one-piece H-clips, two-piece H-clips, edge profiles; polycarbonate construction of colour to match panels.
- .3 Fasteners: purpose made, self-tapping/self-drilling as required to suit substrate, complete with neoprene washer.
  - .1 Fabricate fasteners from stainless steel. Obtain approval from Departmental Representative if other corrosion-resistant material/coating is proposed.
- .4 Accessories: provide edge tape, washers, and other accessories necessary for complete installation.

## Part 3 - Execution

### 3.1 EXAMINATION

- .1 Wood Framing Back up to be free of stamps, staples and stickers, etc. prior to polycarbonate installation.
- .2 Wood framing backup to be free of dust, splinters and debris prior to installation of polycarbonate.

### 3.2 PREPARATION

- .1 Cut panels using hand or power saws. Use fine-toothed saw blade. Cut edges to be clean, straight, plumb, and free of any splintering, cracking or defects.
- .2 Pre-drill holes no closer than 38 mm from panel ends. Oversize fastener holes 5 mm.

### 3.3 INSTALLATION

- .1 Face of Polycarbonate to be flush with adjoining finishes as indicated by the Drawings.
- .2 Install sheets with rib channels sloping downwards to reduce accumulation of dirt inside sheet and ease drainage of any condensation.
- .3 Install edge profile to unprotected ends. Install with short leg on outer face of sheet.
- .4 Install with adjoining edges connected by H-clips.
- .5 Fasten trim to panels, and panels to substrate using fasteners at spacings recommended by manufacturer.
- .6 Ensure fasteners are driven perpendicular and are snug; but, not overtightened.
- .7 Cut edges to be clean, straight and plumb and free of any splintering, cracking or defects.
- .8 Edges and joints to be finished with Manufacturers pre-fabricated fittings unless notes otherwise.
- .9 Wood Framing Back up to be free of dust, grading stamps, staples and stickers, etc. prior to polycarbonate installation.
- .10 Fasteners: Coordinate finish with Consultant

### **3.4 CLEANING**

- .1 Wash panels with mild detergent-type cleaners.
- .2 Apply cleaners, in accordance with manufacturer's instructions, with soft cloth. Rinse thoroughly and dry with soft cloth to eliminate cleaning agent film build-up.
- .3 Do not use brushes, squeegees, sponges, or other items that may scratch or damage the surface or UV protective coating.
- .4 Test small area before applying over entire surface.

**END OF SECTION**

## Part 1 - General

### 1.1 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry.
- .2 Section 07 92 00 - Joint Sealants.
- .3 Section 07 31 29 - Wood Shingle Roofing

### 1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM).
  - .1 ASTM C920-14, Specification for Elastomeric Joint Sealants.
  - .2 ASTM F1667-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- .2 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  - .2 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Damp-proofing and Waterproofing.

### 1.3 DEFINITIONS

- .1 Custom colours: colours not normally produced by the industry and have not been assigned a "QC" number.
- .2 Special colour range: colours produced by the industry that have been assigned a "QC" number but are more costly to produce than "standard colour range".
- .3 Standard colour range: colours produced by the industry that are currently popular and/or cost effective and have been assigned a "QC" number. Colour is independent of gauge of steel.
- .4 Stock colour range: colours stocked by an individual manufacturer for the gauge specified.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Prevent contact of dissimilar metals during storage and protect from corrosive materials and elements.
- .3 To prevent permanent staining from acidic perspiration, wear clean gloves when handling material during transportation, fabrication, and installation.

## Part 2 - Products

### 2.1 METAL MATERIALS

- .1 Pre-Painted Aluminum: 0.81mm thick.
  - .1 Colour: custom colour, as selected by Departmental Representative.
- .2 Chimney Collar; sheet steel, 24 ga., one-piece construction, galvanized. 100mm x 50mm wide on roof, size and configuration as required for chimney size and roof slope as shown as drawings.

- .3 Galvanizing: hot dipped zinc coating of 600g/m2 in accordance with CAN/ CSA-G164.

## **2.2 ACCESSORIES**

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Asphalt primer: to CGSB 37-GP-9M.
- .3 Plastic cement: to CAN/CGSB-37.5-M.
- .4 Fasteners: to ASTM F1667, flat head roofing nails, of length and thickness suitable for flashing application; of same material as sheet metal.
- .5 Sealant: silicone, to ASTM C920, Type S, Grade NS, uses NT, G, M, A and O.

## **2.3 FABRICATION**

- .1 Fabricate metal flashings to profiles indicated.
- .2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 13 mm. Miter and seal corners with sealant.
- .4 Use flat lock seam joints, unless otherwise shown. Soldering will not be permitted.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

## **Part 3 - EXECUTION**

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

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

### **3.2 INSTALLATION**

- .1 Install flashings as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Erect metalwork square, plumb, straight and true, accurately fitted with tight joints and intersections.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.

### **3.3 ADJUST AND CLEAN**

- .1 Clean flashing surfaces after installation. Do not use solvents detrimental to finish or adjacent materials.
- .2 Remove all fasteners, metal clippings, etc., from roof surfaces and site.

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 31 29 - Wood Shingle Roofing

### **1.2 REFERENCE STANDARDS**

- .1 ASTM C 165-00: Standard Test Method for Measuring Compressive Properties of Thermal Insulations
- .2 ASTM D 6818: Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products
- .3 ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials

### **1.3 SUBMITTALS**

- .1 General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- .2 Product Data: Submit manufacturer's product data and installation instructions.
- .3 Samples: Submit selection and verification samples.
- .4 Closeout Submittals: Submit the following:
- .5 Warranty documents specified herein.

### **1.4 QUALITY ASSURANCE**

- .1 Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.
- .2 Mock-Ups: 1200mm x 1200mm area showing complete, new roof assembly as outlined in the Drawings.
  - .1 Subject to acceptance by owner, mock-up may be retained as part of finish work.
  - .2 If mock-up is not retained, remove and properly dispose of mock-up.

### **1.5 DELIVERY, STORAGE & HANDLING**

- .1 General: Comply with Division 1 Product Requirement Section.
- .2 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .3 Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

### **1.6 WARRANTY**

- .1 Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- .2 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.
  - 1. Warranty Period: 50 years, beginning with date of substantial completion.

## Part 2 - Products

### 2.1 MATERIALS

- .1 Ventilated Underlayment:  
Cedar Breather® or approved equivalent:
  - a. Description: Three-dimensional matrix in roll form.
  - b. Color: Black
  - c. Material: Nylon
  - d. Width: 39.37 inches (1 m).
  - e. Length: 61 1/2 feet (18.75 m).
  - f. Coverage Area: 200 ft<sup>2</sup> (18.58 m<sup>2</sup>)
  - g. Thickness: 0.277 inches (7.04 mm).
  - h. Weight: 9.7 lbs/roll
  - i. Fire Rating: A

### 2.2 ACCESSORIES

- .1 Provide the following accessories:
  - 1. Self-adhesive underlayment as specified in Section 07 31 29 - Wood Shingle Roofing.
  - 2. Fasteners:
    - .1 Type: Blunt-tipped, ring shank stainless steel nails.
    - .2 Material: Corrosion protected steel.
    - .3 Size: Suitable for project application.

## Part 3 - Execution

### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with the instructions and recommendations of the underlayment manufacturer.

### 3.2 EXAMINATION

- A. Site Verification of Conditions:
  - 1. Verify that site conditions are acceptable for installation of the underlayment.
  - 2. Do not proceed with installation of rainscreen until unacceptable conditions are corrected.

### 3.3 INSTALLATION

- .1 Cedar Shingle Installation
  - a. Install plywood deck onto roof framing as specified in related section
  - b. Install 30lb (14kg) roofing felt over entire roof deck. Extend felt 1/4" (6.4mm) beyond edge of roof deck. Overlap layers at least 4" (102mm) working toward the ridge.
  - c. Tack down underlayment with 1 nail approximately every 3 square feet.
  - d. Install ventilated underlayment with dimples down to present the flat side as the nailing surface.
  - e. Butt each course of underlayment against previous course. Do not overlap layers of underlayment.
  - f. Work from fascia to ridge while installing shingles to avoid walking directly on underlayment.
  - g. Install cedar shingles in conformance with the requirements of Section 07 31 29 - Wood Shingle Roofing.

### 3.4 PROTECTION

- .1 Protect installed work from damage due to subsequent construction activity on the site.

**End of Section**

## Part 1 - General

### 1.1 RELATED REQUIREMENTS

- .1 Section 07 84 00 - Fire Stopping.

### 1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM).
  - .1 ASTM E84-17a, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - .2 ASTM E119-16a, Test Methods for Fire Tests of Building Construction and Materials.
  - .3 ASTM E605-93(2015)e1, Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
  - .4 ASTM E736-17, Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
  - .5 ASTM E759/E759M-92(2015)e1, Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
  - .6 ASTM E760/E760M-92(2015)e1, Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
  - .7 ASTM E761/E761M-92(2015)e1, Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
  - .8 ASTM E859/E859M-93(2015)e1, Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
  - .9 ASTM E937/E937M-93(2015)e01, Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
  - .10 ASTM G21-15, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- .2 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
  - .2 CAN/ULC-S102-11, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .3 CAN/ULC-S114-05, Standard Method of Test for Determination of Non Combustibility in Building Materials.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
  - .1 Convene pre-installation meeting one (1) week prior to beginning work of this Section, with contractor's representative, fire-proofing contractor, and Departmental Representative to:
    - .1 Verify Project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
  - .2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.
  - .3 Hold project meetings at discretion of Departmental Representative.
  - .4 Ensure key personnel attend.
- .2 Site Meetings: as part of Manufacturer's Services described in Article 3.5 - Field Quality Control, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
  - .2 Twice during progress of Work at 25% and 60% complete.

- .3 Upon completion of Work, after cleaning is carried out.

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Quality assurance submittals:
  - .1 Fire Test Design Selection: Submit tested designs which apply to the project construction assemblies or details. The selected designs must have been tested in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics. The design selection priority must be respected, as follows:
    - .1 Direct reference: Use ULC tested designs which come from the ULC Fire Resistance Directory, or any UL design taken from the UL Fire Resistance Directory that is certified for Canada (cUL).
    - .2 If no designs are available from the CAN/ULC-S101 Canadian Test Standard, refer to any design tested upon the ASTM E-119 Testing Standard.
    - .3 If the project assembly or detail cannot be supported by any ULC, UL or ASTM tested design source, submit a technical proposal that best matches the project situations.
    - .4 Any alternate proposal must come from or be assisted by the Fireproofing manufacturer.
    - .5 Any structure system or element which does not meet the dimension requirements stated in the tested design must be protected by a thickness based upon its particular M/D Ratio.
  - .2 Manufacturer's Field Reports: submit manufacturer's written reports within three (3) days of review, verifying compliance of Work, as described in Article 3.5 - Field Quality Control.

#### 1.5 QUALITY ASSURANCE

- .1 Qualification:
  - .1 Applicators specializing in spray-applied fireproofing, approved by fireproofing manufacturer and having minimum five (5) years documented experience.
- .2 Labeling:
  - .1 Fireproofing material shall bear ULC/cUL label verifying that materials conform to ASTM E119 and/or CAN/ULC-S101.
- .3 Mock-Up:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Apply fireproofing to approximately 10 m<sup>2</sup> area of surfaces of mock-up matching surface to be treated.
  - .3 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application.
  - .4 Locate where directed.
  - .5 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with fireproofing work.
  - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
  - .1 Store materials in dry location.
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
  - .3 Damaged or opened containers will be rejected.
  - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
  - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

## 1.7 AMBIENT CONDITIONS

- .1 Ensure that a 5°C air and substrate temperature is maintained 24 hours before, during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.
- .2 Maintain relative humidity within limits recommended by fireproofing manufacturer.
- .3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.
- .4 In enclosed areas lacking openings for natural ventilation, provide minimum of four (4) air exchanges per hour by forced air circulation.

## Part 2 - Products

### 2.1 MATERIALS

- .1 Spray fireproofing: ULC certified, mineral wool free, qualified for use in ULC Designs. Use fireproofing from only one manufacturer.
  - .1 Gypsum based - Standard Density.
    - .1 Properties:
      - .1 Density (ASTM E605): 240 kg/m<sup>3</sup> nominal.
      - .2 Combustibility (CAN/ULC-S114): Passed, noncombustible.
      - .3 Compressive Strength (ASTM E761/E761M): >158 kPa.
      - .4 Cohesion / Adhesion (ASTM E736): >9.5 KPa.
      - .5 Impact (ASTM E760/E760M): Passed.
      - .6 Deflection (ASTM E759/E759M): Passed.
      - .7 Corrosion of Steel (ASTM E937/E937M): Passed.
      - .8 Air Erosion (ASTM E859/E859M): 0.00 g/m<sup>2</sup>.
      - .9 Surface Burning (ASTM E84):
        - .1 Flame Spread: 0.
        - .2 Smoke: 0.
      - .10 Fungi Resistance (ASTM G21): Passed, no growth at 28 days with or without mold inhibitor.

## **2.2 MISCELLANEOUS MATERIALS**

- .1 Water: clean, potable and free of any deleterious substances which may affect the set of fireproofing.
- .2 Provide the following items as standard procedure with each of the fireproofing systems, as recommended by the manufacturer for each condition and substrate.
  - .1 Primers: Recommended Steel Primers as being listed on UL's Directory Category CGJM, or any primer for which adhesion/cohesion capabilities of the sprayed fire resistive material has been verified by the fireproofing manufacturer.
  - .2 Adhesives/bonding agents: Provide adhesive/bonding agent as necessary to comply with fireproofing manufacturers' and fire test design requirements.
  - .3 Lath: Provide expanded metal lath for areas where adhesion to substrate is not compatible, to comply with ULC/UL requirements for application to primed or painted steel, or as otherwise required by the fire test design information.
  - .4 Curing compound: type recommended by fireproofing manufacturer, qualified for use in applicable ULC Design.
  - .5 Sealer: type recommended by fireproofing manufacturer, qualified for use in applicable ULC Design.

## **Part 3 - Execution**

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

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

### **3.2 PREPARATION**

- .1 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.
- .2 Surface preparation:
  - .1 Clean substrate to ensure it is free of material, which would impair bond.
- .3 Ensure that:
  - .1 Clips, hangers, sleeves and similar devices have been attached.
  - .2 Items required to penetrate fireproofing are placed.
  - .3 Ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.
- .4 Discard materials which have come into contact with water prior to actual use.

### **3.3 APPLICATION - GENERAL**

- .1 Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- .2 Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- .3 Apply fireproofing to steel floor decks after completion of concrete work on that deck.

### **3.4 APPLICATION**

- .1 Cooperate in coordinating and scheduling of work.
- .2 Key the face of the first application to provide a suitable bonding surface for the second coat. Apply remaining coating and finish as specified.

- .3 Apply fireproofing over substrate, building up to required thickness and density. Apply proper thickness and densities.
- .4 Finish texture to match sample; as sprayed.
- .5 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .6 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide fire resistance rating as indicated.

### **3.5 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Article 1.4 - Action and Informational Submittals.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in Article 1.3 - Administrative Requirements.

### **3.6 PATCHING**

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

### **3.7 CLEANUP**

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 Clean all exposed finished walls and floor areas where fireproofing has been deposited in a manner which will not damage finished surface. Leave area in a broom-clean condition after completion of work.
- .3 On completion, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 07 81 00 - Spray-Applied Fireproofing.
- .2 Section 07 92 00 - Joint Sealants.
- .3 Section 10 44 00 - Fire Protection Specialties.

### **1.2 REFERENCE STANDARDS**

- .1 Underwriter's Laboratories of Canada (ULC):
  - .1 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.

### **1.3 DEFINITIONS**

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

### **1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-Installation Meetings:
  - .1 Convene pre-installation meeting one (1) week prior to beginning work of this Section, with contractor's representative, firestopping contractor, and Departmental Representative to:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Site Meetings: as part of Manufacturer's Services described in Article 3.5 - Field Quality Control, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .2 Twice during progress of Work at 25% and 60% complete.
  - .3 Upon completion of Work, after cleaning is carried out.

### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

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

- .4 Samples:
  - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality assurance submittals:
  - .1 Submit ULC design system for each type of joint and service penetration.
    - .1 Show proposed material, fire rating, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
    - .2 Where more than one product is acceptable for a component, clearly indicate the product being supplied on this Project.
    - .3 When no ULC or cUL system is available for an application, submit manufacturer's engineered judgement identification number and drawing details. Engineered judgement shall include both project name and contractor's name who will install firestopping system as described in drawing.
  - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
  - .3 Manufacturer's Field Reports: submit manufacturer's written reports within three (3) days of review, verifying compliance of Work, as described in Article 3.5 - Field Quality Control.

## **1.6 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company specializing in fire stopping installations approved by manufacturer.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate manufacturer.
- .2 Storage and Protection:
  - .1 Store materials in dry location, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

## **Part 2 - Products**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.
  - .2 Firestopping system rating: not less than the fire-resistance rating of surrounding floor and wall assembly.
- .2 Service penetration assemblies: systems tested to CAN/ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN/ULC-S115.

- .4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .5 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .6 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .7 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .8 Sealants for vertical joints: non-sagging.

### **Part 3 - Execution**

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

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

#### **3.2 PREPARATION**

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

#### **3.3 INSTALLATION**

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

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

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

### **3.5 FIELD QUALITY CONTROL**

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Article 1.5 - Action and Informational Submittals.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in Article 1.4 - Administrative Requirements.

### **3.6 CLEANING**

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

### **3.7 SCHEDULE**

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

**END OF SECTION**

## **Part 1 - General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 06 20 00 - Finish Carpentry.
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .3 Section 09 21 16 - Gypsum Board Assemblies.
- .4 Section 09 30 13 - Ceramic Tiling.
- .5 Section 09 30 15 - Quarry and Paver Tiling.

### **1.2 REFERENCE STANDARDS**

- .1 ASTM International (ASTM).
  - .1 ASTM C920-18, Specification for Elastomeric Joint Sealants.
- .2 Canadian General Standards Board (CGSB).
  - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Manufacturer's product to describe:
    - .1 Caulking compound.
    - .2 Primers.
    - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Samples:
  - .1 Submit two (2) samples of each type of material and colour.
  - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
- .4 Manufacturer's Instructions:
  - .1 Submit instructions to include installation instructions for each product used.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

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

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect joint sealants from nicks, scratches, and blemishes.

- .3 Replace defective or damaged materials with new.

## 1.6 SITE CONDITIONS

- .1 Ambient Conditions:
  - .1 Proceed with installation of joint sealants only when:
    - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4°C.
    - .2 Joint substrates are dry.
    - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
  - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

## Part 2 - Products

### 2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

### 2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Urethane, two-part: to ASTM C920, Type M, Grade NS, Class 25; Uses T, NT, M, A and O.
- .2 Silicones one (1) part.
  - .1 Mildew resistant: ASTM C920, Type S, Grade NS, Class 25; Uses NT, A and O: single component with fungicide; colour to match adjacent surfaces.
- .3 Acrylics one part: to CGSB 19-GP-5M.
- .4 Preformed compressible and non-compressible back-up materials:
  - .1 Polyethylene, urethane, neoprene or vinyl foam:
    - .1 Extruded-closed-cell foam backer rod.
    - .2 Size: oversize 30 to 50 %.
  - .2 Bond breaker tape:
    - .1 Polyethylene bond breaker tape which will not bond to sealant.

### 2.3 SEALANT SELECTION

- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): sealant type: urethane sealant.

- .2 Control and expansion joints in exterior surfaces of unit masonry walls: sealant type: urethane sealant.
- .3 Seal interior perimeters of exterior openings as detailed on drawings: sealant type: urethane sealant.
- .4 Joints of underside of precast beams or planks: sealant type: urethane sealant.
- .5 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: sealant type: urethane sealant.
- .6 Interior control and expansion joints in floor surfaces: sealant type: urethane sealant.
- .7 Perimeters of interior frames, sealant type: acrylic sealant.
- .8 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, water closets, basins, vanities): sealant type: mildew resistant silicone sealant. Sealant not required for self-rimming sinks.
- .9 Backslash of washroom vanities: sealant type: mildew resistant silicone sealant.
- .10 Exposed interior control joints in drywall: sealant type: urethane.

## **2.4 JOINT CLEANER**

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

## **Part 3 - Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 SURFACE PREPARATION**

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

### **3.3 PRIMING**

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

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

### **3.4 BACKUP MATERIAL**

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

### **3.5 MIXING**

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

### **3.6 APPLICATION**

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

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean adjacent surfaces immediately.
  - .3 Remove excess and droppings, using recommended cleaners as work progresses.
  - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.8 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

**END OF SECTION**