

**Part 1 General**

**1.1 REFERENCES**

- .1 ASTM C836-10 - High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
- .2 ASTM D412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .3 ASTM D3786/D3786M-09, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
- .4 ASTM D5034-09 (2013), Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
- .5 ASTM E96/E96M-05, Standard Test Methods for Water Vapor Transmission of Materials.
- .6 CAN/CGSB 37.58-M86, Membrane, Elastomeric, Cold-Applied Liquid, for Non-Exposed Use in Roofing and Waterproofing.

**1.2 SUBMITTALS**

- .1 Section 01 33 00: Submittal Procedures.
- .2 Product Data: Provide data for surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants, with temperature range for application of waterproofing membrane.
- .3 Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
- .4 Certificate: Certify that Products meet or exceed specified requirements.
- .5 Installation Data: Manufacturer's special installation requirements indicating special procedures and perimeter conditions requiring special attention.

**1.3 PROJECT CONDITIONS**

- .1 Ensure ambient air temperature is 4°C to 32°C at application time and temperature will remain above 4°C for at least 24 hours after application.

**1.4 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.

**Part 2 Products**

**2.1 MEMBRANE COMPOUND MATERIAL**

- .1 Waterproofing Membrane: To CAN/CGSB 37.58 and ASTM C836; cold liquid-applied one component, moisture-curing, bitumen modified, polyurethane elastomeric compound, 1.2 mm (48 mils) minimum cured thickness. Properties of membrane compound material in high build system:

<u>Properties</u>	<u>Test</u>	<u>Results</u>
Tensile Strength	ASTM D412	1.4 MPa
Elongation	ASTM D412	300%
Moisture Vapour Transmission	ASTM E96	0.075 dry perms
100% Modulus	ASTM D412	0.6 MPa

**2.2 ACCESSORIES**

- .1 Reinforcing fabric: Polyester, as recommended by membrane manufacturer for use in high-build waterproofing system.
- .1 Elongation to ASTM D5034: 54% MD, 147% CD.
- .2 Grab breaking to ASTM D5034: 24.5 kg (54 lb) MD, 14.5 kg (32 lb) CD.
- .3 Mullen burst to ASTM D3786: 480 kPa (70 psi).

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify existing conditions before starting work.
- .2 Verify substrate surfaces are thawed and dry, free of loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
- .3 Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- .4 Verify items that penetrate surfaces to receive waterproofing are securely installed.

**3.2 PREPARATION**

- .1 Protect adjacent surfaces not designated to receive waterproofing.
- .2 Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's written instructions.
- .3 Do not apply waterproofing to surfaces unacceptable to manufacturer.
- .4 Seal cracks and joints less than 1.6 mm (1/16 inch) with membrane material, using depth to width ratio as recommended by sealant manufacturer.

**3.3 APPLICATION**

- .1 Install fluid-applied waterproofing to manufacturer's written instructions.
- .2 Apply first layer of waterproofing material to 1.5 mm wet thickness.
- .3 Apply extra thickness of waterproofing material at corners, intersections, angles, and over joints.
- .4 Set and embed reinforcing fabric into wet waterproofing material. Overlap fabric seams minimum 75 mm.
- .5 Allow first coat to cure overnight, then apply second layer of waterproofing material to 1.5 mm wet thickness.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM C209-12, Standard Test Methods for Cellulosic Fiber Insulating Board.
  - .2 ASTM C518-10, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - .3 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
  - .4 ASTM E96/E96M-12, Standard Test Methods for Water Vapor Transmission of Materials.
- .2 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC S102-03, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC S114-05, Test for Determination of Non-Combustibility in Building Materials.
  - .3 CAN/ULC S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .4 CAN/ULC S702-09, Standard for Mineral Fibre Thermal Insulation for Buildings.
  - .5 CAN/ULC S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.2 SUBMITTALS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheets.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets. Indicate VOC's insulation products and adhesives.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.
- .4 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

### **1.3 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver materials in manufacturer's original containers clearly labeled with manufacturer's name, product identification, safety information, net weight of contents and expiration date.
- .2 Store material in a safe manner and where the temperatures are within range specified by manufacturer.
- .3 Remove empty containers from site on a daily basis.
- .4 Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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

- .1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 BOARD INSULATION**

- .1 Extruded polystyrene (XPS) for walls: To CAN/ULC S701, closed cell rigid board.
  - .1 Compressive strength to ASTM D1621: Minimum 210 kPa.
  - .2 Thermal resistance to ASTM C518: RSI 0.88/25 mm.
  - .3 Thickness: As indicated on Drawings.
  - .4 Edges: Square.
- .2 Extruded polystyrene (XPS) for roof: To CAN/ULC S701, Type 4, closed-cell rigid board.
  - .1 Compressive strength to ASTM D1621: Minimum 275 kPa.
  - .2 Flexural strength to ASTM C203: Minimum 480 kPa.
  - .3 Thermal resistance to ASTM C518: RSI 0.88/25 mm.
  - .4 Water absorption to ASTM D2842: Maximum 0.6% by volume.
  - .5 Thickness: As indicated on Drawings.
- .3 Concrete faced rigid insulation boards:
  - .1 Extruded polystyrene: To CAN/ULC S701 Type 4.
    - .1 Thermal resistance to ASTM C518: RSI 0.88/25 mm.
    - .2 Compressive strength to ASTM D1621: Minimum 240 kPa.
    - .3 Water absorption to ASTM D2842: < 0.7% by volume.
    - .4 Water vapour permeance to ASTM E96: 0.8 perms.
    - .5 Insulation thickness: As shown on drawings.
  - .2 Concrete: Latex modified concrete mix, 8 mm thick, with control joint score at mid-length. Textured broom finish.
  - .3 Edges: Tongue-and-groove along longitudinal foam edges, but joints on lateral edges.

- .4 Rigid Cellular Polyisocyanurate:
  - .1 Faced: To CAN/ULC S704.
    - .1 Polyisocyanurate core: Closed cell.
    - .2 Facers: Organic, reinforced with glass fibre.
    - .3 Shape: Flat.
  - .2 Thickness: As indicated on Drawings.
  - .3 Thermal resistance to ASTM C518: R 6.0/25 mm.
  - .4 Compressive strength to ASTM D1621: Minimum 110 kPa.
  - .5 Water absorption to ASTM C209: 0.1% by volume.
  - .6 Vapour Permeance to ASTM E96: 0.05 perms.
  - .7 Surface burning characteristics to CAN/ULC S102:
    - .1 Flame spread: Maximum 25.
    - .2 Smoke developed: Maximum 450.

## **2.2 BATT INSULATION**

- .1 Batt insulation: To CAN/ULC S702, Type 1; non-combustible to CAN/ULC S114, semi-rigid mineral wool batt insulation.
  - .1 Surface burning characteristics to CAN/ULC S102:
    - .1 Flame spread: 0.
    - .2 Smoke developed: 0.

## **2.3 ACCESSORIES**

- .1 Insulation clips: 50 mm diameter plastic ring, with reinforced centre to prevent fastener pull-through.
- .2 Concrete-faced insulation board clips: Purpose made clips, as recommended by concrete-faced insulation panel manufacturer; self-tapping concrete screw attachment.
- .3 Tape and adhesives: As recommended by manufacturer.

## **Part 3 Execution**

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

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

### **3.2 GENERAL**

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

### **3.3 EXAMINATION**

- .1 Examine substrates and inform Departmental Representative of defects.
- .2 Verify substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.
- .3 Confirm mechanical and electrical service lines in walls and ceilings to be insulated have been inspected.

### **3.4 BOARD INSULATION INSTALLATION**

- .1 Attach using impale fasteners to substrate at a frequency of six (6) per insulation board.
- .2 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

### **3.5 BATT INSULATION INSTALLATION**

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Friction fit batts between studs, free of sags, folds, voids, or open joints.
- .3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .4 Do not compress insulation excessively to fit voids.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

### **3.6 CLEANING**

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

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM E96/E96M-05, Water Vapor Transmission of Materials.
  - .2 ASTM E2178-13, Standard Test Method for Air Permeance of Building Materials.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .3 Underwriters Laboratories of Canada
  - .1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

**1.2 SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit WHMIS Material Safety Data Sheets.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.
- .2 Clean spills and leave area as it was prior to spill.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Remove waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**1.5 MOCK-UPS**

- .1 Construct mock-up of vapour barrier installation including one lap joint, one inside corner, and at one electrical box.
- .2 Construct mock-up of air barrier installation including one lap joint, one inside corner, and one window opening.



- .3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
- .4 Allow two (2) working days for review of mock-up by Departmental Representative before proceeding with sheet barrier work.
- .5 Mock-ups may remain as part of Work.

## **1.6 SEQUENCING**

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

## **Part 2 Products**

### **2.1 GENERAL**

- .1 Provide air/vapour barrier system components from one manufacturer.

### **2.2 SHEET MATERIALS**

- .1 Air barrier: Spun-bonded polyolefin, nonwoven, non-perforated weather barrier.
  - .1 Physical properties:
    - .1 Air leakage to ASTM E2178:  $<0.005 \text{ L/s.m}^2$  at 75 Pa.
    - .2 Water vapour permeance to ASTM E96 Method B:  $1800 \text{ ng/Pa.s.m}^2$  (30 perms).
- .2 Vapour barrier: Polyethylene sheet to CAN/CGSB 51.34, 0.15 mm (6 mil) thickness.
  - .1 Water vapour Permeance: Maximum  $45 \text{ ng/Pa.s.m}^2$ .
  - .2 Flame spread to CAN/ULC S102: Maximum 150.

### **2.3 ACCESSORIES**

- .1 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.
- .2 Sealant: Compatible with sheet barrier material, recommended by vapour retarder manufacturer.
- .3 Staples: minimum 6 mm leg.
- .4 Seam tape: As recommended by barrier manufacturer, minimum 50 mm (2 inches) wide.

## **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 EXAMINATION**

- .1 Verify surfaces and conditions are ready to accept work of this section.
- .2 Ensure surfaces are clean, dry, sound, smooth, continuous, and in compliance with air/vapour barrier manufacturer's requirements.
- .3 Report unsatisfactory conditions to Departmental Representative.
- .4 Do not start work until deficiencies have been corrected.
  - .1 Beginning of Work implies acceptance of conditions.

### **3.3 PREPARATION**

- .1 Remove loose or foreign matter that might impair adhesion of materials.
- .2 Ensure services are installed and inspected prior to installation of retarder.
- .3 Ensure substrates are clean of oil or excess dust; open joints filled; and concrete surfaces free of large voids, spalled areas, or sharp protrusions.
- .4 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
- .5 Ensure metal closures are free of sharp edges and burrs.

### **3.4 AIR BARRIER INSTALLATION**

- .1 Install sheathing membrane horizontally beginning 50 mm (2 inches) below the lowest point of the framed wall assembly.
- .2 Install successive strips, proceeding upwards with each succeeding sheet overlapping the sheet below.
- .3 Cut sheathing membrane into suitable widths to allow for the proper integration and lapping of successive courses.
- .4 Horizontal laps: Minimum 100 mm (4 inches) and arranged to shed exterior moisture away from building.
- .5 Vertical laps: Where required by overlapping sheets, minimum 150 mm (6 inches).
- .6 Fully form all inside corners to prevent tenting.
- .7 Ensure that lapping rules are followed at all locations and around all intersections of building elements and at all penetrations and openings.

### **3.5 INSTALLATION – VAPOUR BARRIER**

- .1 Install materials in accordance with manufacturer's instructions.
- .2 Use sheets of largest practical size to minimize joints.
- .3 Lap seams and edges minimum 50 mm.
- .4 Position lap seal over firm bearing.
- .5 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

- .6 Do not leave applied air and vapour barriers exposed for longer than 72 hours.

### **3.6 EXTERIOR SURFACE OPENINGS – VAPOUR BARRIER**

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

### **3.7 PERIMETER SEALS – VAPOUR BARRIER**

- .1 Seal perimeter of sheet vapour barrier:
  - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
  - .2 Lap sheet over sealant and press into sealant bead.
  - .3 Install staples through lapped sheets at sealant bead into wood substrate.
  - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

### **3.8 LAP JOINT SEALS – VAPOUR BARRIER**

- .1 Seal lap joints of sheet barrier vapour:
  - .1 Attach first sheet to substrate.
  - .2 Apply continuous bead of sealant over solid backing at joint.
  - .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
  - .4 Install staples through lapped sheets at sealant bead into wood substrate.
  - .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

### **3.9 ELECTRICAL BOXES – VAPOUR BARRIER**

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

### **3.10 CLEANING**

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

### **3.11 PROTECTION OF WORK**

- .1 Do not permit adjacent work to damage work of this section.
- .2 Ensure finished work is protected from climatic conditions.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        ASTM D226/D226M-09, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- .2        ASTM D4869/D4869M-05 (2011)e1, Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
- .3        CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt.
- .4        CAN/CSA O80 Series-08 (R2012), Wood Preservation.
- .5        CSA O118.1-97(R2002) - Western Cedar Shakes and Shingles.
- .6        CSSB (Cedar Shake and Shingle Bureau).
- .7        UL 790 - Tests for Fire Resistance of Roof Covering Materials.

**1.2                SUBMITTALS**

- .1        Section 01 33 00: Submittal Procedures.
- .2        Product Data: Provide data indicating material characteristics, performance criteria, limitations.
- .3        Shop Drawings: Indicate metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- .4        Installation Data: Manufacturer's special installation requirements and procedures.
- .5        Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

**1.3                MAINTENANCE MATERIAL SUBMITTALS**

- .1        Extra Stock Materials: Provide extra shingles sufficient to provide coverage for 5% of total exposed area of installed shingles for entire project.

**1.4                STORAGE, DELIVERY, AND HANDLING**

- .1        Deliver and store materials in original bundles with manufacturer's labels and seals intact.
- .2        Store materials elevated from contact with ground and moisture, and protected from weather.
- .3        Store roofing felt on end, one pallet high; do not store in a leaning position.

## **1.5 REGULATORY REQUIREMENTS**

- .1 Conform to applicable code for UL 790 fire resistance on shingles.

## **Part 2 Products**

### **2.1 SHINGLES**

- .1 Cedar Shingles: CSA O118.1 and CSSB, sized and graded, No. 1 (Blue Label); square cut; pressure-treated to CAN/CSA O80 Series with non-leaching fire retardant.
  - .1 Width: Random, between 100 to 350 mm.
  - .2 Length: 457 mm.
  - .3 Fire rating: Class B.

### **2.2 SHEET MATERIALS**

- .1 Underlayment:
  - .1 Description: Three-dimensional spun nylon matrix sheet.
  - .2 Color: Black.
  - .3 Material: Nylon.
  - .4 Width: 1 metre.
  - .5 Thickness: 6 mm.
  - .6 Fire Rating: A.

### **2.3 ACCESSORIES**

- .1 Nails: Stainless steel, Type 316, 2.0 mm thick; sinker head; length sufficient to penetrate sheathing minimum 19 mm.
- .2 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
- .3 Zinc strips: 0.6 mm thick, 75 mm wide, 99.5% zinc.

### **2.4 FLASHING MATERIALS**

- .1 Sheet Flashings: 0.70 mm thick steel with minimum 380 g/m<sup>2</sup> galvanized coating.
- .2 Bituminous Paint: Acid and alkali resistant type; black colour.

### **2.5 FLASHING FABRICATION**

- .1 Form flashings to profiles indicated on Drawings, and to protect materials from physical damage and shed water.
- .2 Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.

- .3 Hem exposed edges of flashings minimum 6 mm on underside.
- .4 Apply bituminous paint on concealed surfaces of flashings.
- .5 Valleys:
  - .1 Minimum width: 600 mm.
  - .2 Centre-crimped.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verify existing conditions before starting work.
- .2 Verify that plumbing stacks and roof penetrations are in place and flashed to deck surface.
- .3 Verify roof openings are correctly framed.
- .4 Verify deck surfaces are dry, free of ridges, warps, or voids.

#### **3.2 PREPARATION**

- .1 Broom clean deck surfaces.

#### **3.3 INSTALLATION - METAL FLASHING AND ACCESSORIES**

- .1 Install flashings to CSSB requirements.
- .2 Weather lap joints minimum 50 mm and seal weather tight with plastic cement.
- .3 Secure in place with nails at 150 mm on centre. Conceal fastenings.
- .4 Valleys: Underlay valley flashing with roofing felt.
- .5 Flash and seal work weather tight, projecting through or mounted on roofing with plastic cement.

#### **3.4 INSTALLATION - PROTECTIVE UNDERLAYMENT**

- .1 Tack down underlayment with 1 tack (or nail) approximately every 0.28 m<sup>2</sup>.
- .2 Install underlayment with dimples down to present the flat side as the nailing surface.
- .3 Butt each course of underlayment against previous course. Do not overlap layers of underlayment.
- .4 Work from fascia to ridge while installing shingles to avoid walking directly on underlayment.

### **3.5            INSTALLATION - SHINGLES**

- .1      Place shingles in accordance with CSSB requirements to produce straight coursing pattern to produce double thickness over roof area.
- .2      Fasten with two nails per shingle. Install nails 19 mm from edge and 38 mm above exposure line. Install nails flush with surface of shingle. Do not under- or over-drive nails.
- .3      Space adjacent shingles with 3 to 6 mm joints.
- .4      Install first course with edges projecting 38 mm beyond face of fascia boards, and 25 mm over gable ends.
- .5      Provide double course at eaves.
- .6      Install shingles with side lap minimum 38 mm between joints in adjacent courses.
- .7      Install shingles with maximum exposure 108 mm.
- .8      Install zinc strips under every sixth row of shingles and under ridge row.
- .9      Installation at valley: Ensure shingle grain does not run parallel to valley centreline. Cut shingles that extend into the valley at correct mitre.
- .10     Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counter flashings.
- .11     Complete installation to provide weather tight service.

### **3.6            CLEANING**

- .1      Progress Cleaning: Clean in accordance with Section 01 74 11 - Cleaning.
- .2      Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3      Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **3.7            PROTECTION OF FINISHED WORK**

- .1      Do not permit traffic over finished roof surface.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O141-05 (R2014), Softwood Lumber.
- .3 NLGA (National Lumber Grades Authority) - Standard Grading Rules for Canadian Lumber 2007.
- .4 West Coast Lumber Inspection Bureau (WCLIB)
- .5 WWPA (Western Wood Products Association).

**1.2 SUBMITTALS**

- .1 Section 01 33 00: Submittal Procedures.
- .2 Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture, finishes, accessories.
- .3 Samples: Submit duplicate samples, 300 mm long, full width, illustrating profile, surface texture, and finish.
- .4 Installation Data: Manufacturer's special installation requirements.

**1.3 QUALITY ASSURANCE**

- .1 Grade materials in accordance with the following:
  - .1 Lumber Grading: Certified by NLGA or WCLIB.

**1.4 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Western red cedar, Grade B and better, no defects, vertical grain, kiln dried.

**2.2 ACCESSORIES**

- .1 Nails: To CSA B111, Type 304 stainless steel, ring shank, sinker head, 3.0 mm thickness, length sufficient to penetrate studs by 32 mm.



- .2 Flashing: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

### **2.3 FABRICATION - BOARD SIDING**

- .1 Siding Board Size: 25 mm thick x 150 mm high nominal; 18 mm thick x 136 mm high actual.
  - .1 Profile: WWPA Siding Pattern 105, smooth face; smooth back with longitudinal rabbeted channel.
- .2 Trims: Provide trim boards of same grade as siding boards, S4S, dimensions as indicated.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verify existing conditions before starting work.
- .2 Verify that substrate surfaces are ready to receive work.

### **3.2 PREPARATION**

- .1 Pre-treat and paint siding and trim before installation. Refer to Section 09 91 00 – Painting.
- .2 Ensure flashings are installed before commencement of siding application.

### **3.3 INSTALLATION - BOARD SIDING**

- .1 Hand-nail, fastening to studs, maximum 600 mm on centre. Fasten siding in place level and plumb. Nail to aligned pattern.
- .2 Install nails with heads flush with board faces.
- .3 At near ends and edges, drill pilot holes to prevent splitting.
- .4 Mitre horizontal joints tight at 45 degrees.
- .5 Finish field-made end cuts with specified paint.
- .6 Install siding for natural shed of water.
- .7 Position cut ends over bearing surfaces. Sand cut edges smooth and clean.
- .8 Install corner strips, closures, trim.
- .9 Install metal flashings as indicated on drawings.

- .10 Touch-up prefinished paint surfaces that are disfigured. Unsightly touch-up will require removal and replacement of affected siding.

### **3.4 ERECTION TOLERANCES**

- .1 Maximum variation from level: 6 mm/3 m.
- .2 Maximum offset from joint alignment: 1.5 mm.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1     ASTM International
  - .1     ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2     Canadian Roofing Contractors Association (CRCA)
  - .1     Roofing Specifications Manual, current edition.
- .3     Canadian General Standards Board (CGSB)
  - .1     CAN/CGSB 37.5-M89, Cutback Asphalt Plastic Cement.
- .4     Canadian Standards Association (CSA)
  - .1     CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt.
  - .2     CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .5     Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1     Material Safety Data Sheets (MSDS).

**1.2                PERFORMANCE REQUIREMENTS**

- .1     Provide and install sheet metal flashings and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, and other defects.
- .2     Installed sheet metal flashing and trim to be watertight, firmly attached, free of rattles.

**1.3                SUBMITTALS**

- .1     Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2     Product Data:
  - .1     Submit manufacturer's printed product literature for sheet metal flashing materials, specifications, and datasheets. Include product characteristics, performance criteria, physical size, finish, and limitations.
  - .2     Submit two copies WHMIS MSDS - Material Safety Data Sheets for products used.
- .3     Samples:
  - .1     Submit duplicate 50 x 50 mm samples of each type of sheet metal material, illustrating thicknesses and finishes.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 SHEET METAL MATERIALS**

- .1 Zinc coated steel sheet: Minimum 0.70 mm thickness, commercial quality to ASTM A653/A653M, with Z275 (G90) designation zinc coating.

**2.2 ACCESSORIES**

- .1 Isolation coating: Alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
- .4 Cleats: Same material and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .5 Fasteners: Same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: Same material as sheet metal, 1 mm thick with rubber packings.
- .7 Touch-up paint: as recommended by prefinished material manufacturer.

**2.3 FABRICATION**

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- .2 Form pieces in 2400 mm maximum lengths.
  - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
  - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

**2.4 METAL FLASHINGS**

- .1 Form flashings to profiles indicated.

**Part 3            Execution**

**3.1                EXAMINATION**

- .1        Verify existing conditions before starting work.

**3.2                PREPARATION**

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

**3.3                INSTALLATION**

- .1        Install sheet metal work in accordance with CRCA Roofing Specifications Manual.
- .2        Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- .3        Fit flashings tightly in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- .4        Lock end joints and caulk with sealant.

**3.4                CLEANING**

- .1        Proceed in accordance with Section 01 74 11 - Cleaning.
- .2        On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3        Leave work areas clean, free from grease, finger marks, and stains.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM C834-05, Standard Specification for Latex Sealants.
  - .2 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
  - .3 ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.
  - .4 ASTM C1311-02, Standard Specification for Solvent Release Sealants.
  - .5 ASTM E814-13a, Standard Test Method for Fire Tests of Penetration Firestop Systems.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
  - .2 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
  - .3 CAN/CGSB 19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
  - .4 CAN/CGSB 19.21-M87, Sealing and Bedding Compound, Acoustical.
  - .5 CAN/CGSB 19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.2 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 Submit 2 copies of WHMIS MSDS of products to be used on project.
- .3 Manufacturer's Instructions:
  - .1 Submit instructions to include installation instructions for each product used.

### **1.3 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.

### **1.4 QUALITY ASSURANCE**

- .1 Compatibility: Verify sealants used are compatible with their respective joint substrates.
- .2 Provide sealants with appropriate expansion and contraction properties for the joints being sealed.

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

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

### **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 4.4°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        When low toxicity caulks are not possible, confine usage to areas that off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .2        Where sealants are qualified with primers use only these primers.

### **2.2        SEALANT MATERIALS**

- .1        Polyurethane Sealant: To CAN/CGSB 19.24, Type 2, Class B; and ASTM C920, Type M, Grade NS, Use NT, M, A and O; non-sag, multi component, chemical curing.
  - .1        Control joints in concrete floors (when no hard finish is specified), exterior joints, expansion joints, panel walls, perimeter windows.
- .2        Elastomeric Polyurethane Sealant: To CAN/CGSB 19.13, Type 2; and ASTM C920, Type S, Grade NS, Use NT, M, A and O; non-sag, single component, moisture curing hybrid polyurethane.
  - .1        Perimeter caulking of windows and doors.
- .3        Latex Sealant: To CAN/CGSB 19.17; and ASTM C834; single component, acrylic latex or siliconized acrylic latex.
  - .1        General purpose, acoustic sealing, back bedding glazing compound, window frame perimeters.
- .4        Silicone, one part: To CAN/CGSB 19.13; and ASTM C920, Type S, Grade NS; mildew resistant, single component, colour white unless otherwise specified.
  - .1        Around washroom fixtures, lavatories, janitor's sinks, and other wet areas.
- .5        Butyl: To CGSB 19-GP-14M and ASTM C1311.
  - .1        Gutter and flashing sealing, roof vents, metal panel joining, between base plates and slabs, bedding thresholds, secondary glazing seals.
- .6        Preformed compressible and non-compressible back-up materials:
  - .1        Polyethylene, urethane, neoprene or vinyl foam:
    - .1        Extruded closed cell foam backer rod.
    - .2        Size: oversize 30 to 50 %.
  - .2        Neoprene or butyl rubber:
    - .1        Round solid rod, Shore A hardness 70.
  - .3        High density foam:
    - .1        Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
  - .4        Bond breaker tape:
    - .1        Polyethylene bond breaker tape that will not bond to sealant.
- .7        Primer: As recommended by sealant manufacturer, where required, for adhesion of sealant to substrate.



## **2.3 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 Verify conditions of substrates are acceptable for joint sealant installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform Departmental Representative of unacceptable conditions.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

### **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 that 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 joint substrates as recommended by sealant manufacturer 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 accordance with sealant manufacturer's instructions.

### **3.6 APPLICATION**

- .1 Sealant:

- .1 Mask edges of joint where irregular surface or sensitive joint border exists, to provide neat joint.
  - .2 Apply sealant in continuous beads.
  - .3 Apply sealant with gun with proper size nozzle.
  - .4 Use sufficient pressure to fill voids and joints solid.
  - .5 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .6 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .7 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 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **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**