

**PART 1 General**

**1.1 REFERENCES**

- .1 ASTM C208-08a - Cellulosic Fibre, Insulating Board.
- .2 ASTM C423-09a - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.
- .4 ASTM C591-09 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
- .5 ASTM C612-09 - Mineral Fibre Block and Board Thermal Insulation.
- .6 ASTM C1126-04 - Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
- .7 ASTM C1289-08e1 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .8 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.
- .9 ASTM E96/E96M-05 - Test Methods for Water Vapor Transmission of Materials.
- .10 ASTM E795-05 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
- .11 CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .12 CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .13 CAN/ULC-S701-05 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .14 CAN/ULC-S702-09 - Thermal Insulation, Mineral Fibre, for Buildings.
- .15 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .16 CAN/ULC-S706-09 - Wood Fibre Thermal Insulation for Buildings.

**1.2 SUBMITTALS FOR REVIEW**

- .1 Provide Samples as per Section 01 33 00 – Submittal Procedures

**1.3 ENVIRONMENTAL REQUIREMENTS**

- .1 Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

**PART 2 Products**

**2.1 INSULATION MATERIALS**

- .1 Batt Insulation (walls): ASTM C665; preformed glass fiber batt, roll, blanket; friction fit,
  - .1 Fiberglass Pink as manufactured by Owens Corning.
  - .2 Certainteed.
  - .3 John Mainsville.

**PART 3      Execution**

**3.1            EXAMINATION**

- .1      Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.
- .2      Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.
- .3      Verify insulation boards are unbroken, free of damage, with face membrane undamaged.
- .4      Verify surfaces within walls being insulated have been inspected and approved.

**3.2            BATT INSULATION**

- .1      Install batt insulation locations as noted without gaps or voids.
- .2      Fit insulation tight in spaces and behind exterior side of mechanical and electrical services leaving no gaps or voids.

**END OF SECTION**

**Part I        General**

**I.1        REFERENCES**

- .1    ASTM International Inc.
  - .1    ASTM C726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
  - .2    ASTM C728-05, Standard Specification for Perlite Thermal Insulation Board.
  - .3    ASTM C1177/C1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .4    ASTM C1396/C1396M-06a, Standard Specification for Gypsum Board.
  - .5    ASTM D41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  - .6    ASTM D312-00(2006), Standard Specification for Asphalt Used in Roofing.
  - .7    ASTM D448-03a, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
  - .8    ASTM D2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  - .9    ASTM D6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  - .10    ASTM D6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  - .11    ASTM D6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
  - .12    ASTM D6222-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
  - .13    ASTM D6223-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
  - .14    ASTM D6509-00, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.
- .2    Canadian General Standards Board (CGSB)
  - .1    CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  - .2    CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
  - .3    CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .3    Canadian Roofing Contractors Association (CRCA)
  - .1    CRCA Roofing Specifications Manual-1997.
- .4    Canadian Standards Association (CSA International)

- .1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
- .2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.
- .3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .4 CSA A231.1-06, Precast Concrete Paving Slabs.
- .5 CSA O121-08, Douglas Fir Plywood.
- .6 CSA O151-04, Canadian Softwood Plywood.
- .5 Factory Mutual (FM Global)
  - .1 FM Approvals - Roofing Products.
- .6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .7 Underwriters Laboratories' of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings.
  - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

## **I.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Convene pre-installation meeting oneweek prior to beginning waterproofing Work, with roofing contractor's representative Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart 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.

## **I.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures, and indicate VOC content for:
    - .1 Primers.
    - .2 Asphalt.
    - .3 Sealers.

- .3 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .4 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens roofing felts membrane with specification requirements.
- .5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

#### **I.4 QUALITY ASSURANCE**

- .1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems approved by manufacturer with 5 years documented experience.

#### **I.5 FIRE PROTECTION**

- .1 Fire Extinguishers:
  - .1 Maintain one cartridge operated type stored pressure rechargeable type with hose and shut-off nozzle,
  - .2 ULC labelled for A and B class protection.
  - .3 Size 4.5 on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

#### **I.6 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
  - .2 Provide and maintain dry, off-ground weatherproof storage.
  - .3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
  - .4 Remove only in quantities required for same day use.
  - .5 Place plywood runways over completed Work to enable movement of material and other traffic.
  - .6 Store sealants at +5 degrees C minimum.
  - .7 Store insulation protected from daylight weather and deleterious materials.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
  - .2 Fold up metal banding, flatten and place in designated area for recycling.

#### **I.7 SITE CONDITIONS**

- .1 Ambient Conditions

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

## **1.8 WARRANTY**

- .1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 24 months.

## **Part 2 Products**

### **2.1 PERFORMANCE CRITERIA**

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
- .2 Roofing System: to CSA A123.21 for wind uplift resistance.

### **2.2 DECK COVERING**

- .1 Gypsum board sheathing: to ASTM C1396/C1396M Type X, 15.9mm thick.

### **2.3 DECK PRIMER**

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

### **2.4 VAPOUR RETARDER**

- .1 Two-ply asphalt laminated membrane to CAN/CGSB-51.33.

### **2.5 MEMBRANE**

- .1 Base sheet: to CGSB 37-GP-56M polyester fibres to ASTM D6164
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer Atactic Polypropylene (APP) thermoplastic polymer prefabricated sheet, polyester reinforcement, having nominal weight of 180 g/m<sup>2</sup>.
  - .2 Base sheet membrane properties: to CGSB 37-GP-56M.
    - .1 Strain energy (longitudinal/transversal): 9.0/7.0 8.1/8.8 kN/m.
    - .2 Breaking strength (longitudinal/transversal): 17.0/18.0 17.0/12.5 N/5 cm.
    - .3 Ultimate elongation (longitudinal/transversal): 60/70 60/65 %.
    - .4 Tear resistance: 60 N.
    - .5 Cold bending at -30 degrees C : no cracking.
    - .6 Softening point: ≥ 110 degrees C.
    - .7 Dimensional Stability: -0.3 / 0.3 %.
  - .3 ULC certification: Class A.

- .2 Cap sheet membrane: to CGSB 37-GP-56M polyester fibres to ASTM D6164 ASTM D6622.
  - .1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer Atactic Polypropylene (APP) thermoplastic polymer, prefabricated sheet, glass polyester reinforcement, having nominal weight of 250 180 g/m<sup>2</sup>.
  - .2 Type I, fully adhered.
  - .3 Class A-granule surfaced.
    - .1 Colour for granular surface: gray.
  - .4 Grade I-standard service.
  - .5 Bottom surface sanded.
  - .6 Cap sheet membrane properties: to CGSB 37-GP-56M.
    - .1 Strain energy (longitudinal/transversal): 11.0/11.4 kN/m.
    - .2 Breaking strength (longitudinal/transversal): 25.0/16.0 kN/m.
    - .3 Ultimate elongation (longitudinal/transversal): 60/65 %.
    - .4 Tear resistance: 80 N.
    - .5 Cold bending at -30 degrees C: No cracking.
    - .6 Softening point: ≥ 110 degrees C.
    - .7 Static puncture resistance: 370.
    - .8 Dimensional Stability: -0.2 / 0.2 %.
  - .7 ULC certification: Class B.

## **2.6 ADHESIVE**

- .1 Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.

## **2.7 BITUMEN**

- .1 Asphalt: to CAN/CSA A123.4 ASTM D312, Type 2.

## **2.8 POLYSTYRENE INSULATION**

- .1 Extruded polystyrene (XPS) insulation Expanded polystyrene (EPS) insulation to CAN/ULC-S701, Type 2 thickness as indicated, shiplapped edges.

## **2.9 SEALERS**

- .1 Plastic cement: asphalt.

## **2.10 FASTENERS**

- .1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
- .2 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

## **2.11 BALLAST**

- .1 Stone: 19 to 32 mm size, well graded crushed stone gravel ballast to ASTM D448, Gradation 57 opaque, non-porous, washed, free from fines, long splinters, moisture, ice and snow.

## **Part 3 Execution**

### **3.1 QUALITY OF WORK**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual CRCA Roofing Specification Manual of Manitoba Roofing Association Manual, particularly for fire safety precautions.
- .2 Do priming in accordance with manufacturers written recommendations.
- .3 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

### **3.2 EXAMINATION OF ROOF DECKS**

- .1 Verification of Conditions:
  - .1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment:
  - .1 Prior to beginning of work ensure:
    - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
    - .2 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.

### **3.3 PROTECTION OF IN-PLACE CONDITIONS**

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



### **3.4 PREPARATION OF STEEL DECK (CHANNEL TYPE)**

- .1 Install sound absorbing insulation in flutes of acoustical steel roof deck in accordance with deck manufacturer's instructions Section 05 31 00 - Steel Decking.
- .2 Steel decking will be treated with rust proofing or galvanization.

### **3.5 DECK SHEATHING**

- .1 Mechanically fasten to steel deck Gypsum Board Sheathing with reversible mechanical attachments screws to steel deck's upper rib surfaces, spaced 400 mm on centre each way.
- .2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

### **3.6 VAPOUR RETARDER (STEEL DECK)**

- .1 Adhere vapour retarder using solvent based adhesive as per manufacturer's instructions.

### **3.7 VAPOUR RETARDER (CONCRETE/GYPSUM BOARD/PLYWOOD DECK)**

- .1 Embed two ply of felts glass in hot bitumen spread at rate of 1 kg/m<sup>2</sup> for organic asphalt 1.2 kg/m<sup>2</sup> for glass asphalt.
- .2 Modified bituminous vapour retarder sheet.

### **3.8 BALLAST AND PROTECTIVE COVERING**

- .1 Apply stone ballast, dry, as soon as possible after placement of fabric insulation, at minimum rate of 50 kg/m<sup>2</sup>, following insulation manufacturer's recommendations.
- .2 Spread stone ballast to an even thickness over entire roof area.
- .3 Spread additional stone ballast around perimeter of roof for width of 1200 mm to increase ballast weight to 100 kg/m<sup>2</sup>.
- .4 Install paving slabs over fabric on paver levelling pads.
  - .1 Allow slight space between slabs to permit drainage of surface water.
  - .2 Shim up as required to obtain smooth surface transition from slab to slab.

### **3.9 FIELD QUALITY CONTROL**

- .1 Inspections:
  - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
  - .2 Departmental Representative will pay for tests as specified in Section 01 45 00 - Quality Control.
  - .3 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.

### **3.10 CLEANING**

- .1 Remove bituminous markings from finished surfaces.

- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
  - .3 Ensure emptied containers are sealed and stored safely.
  - .4 Divert unused aggregate materials from landfill to local facility for reuse as reviewed by Departmental Representative.
  - .5 Unused paint coating material must be disposed of at official hazardous material collections site as reviewed by Departmental Representative.
  - .6 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
  - .7 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.
  - .8 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.
  - .9 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.
  - .10 Divert unused gypsum materials from landfill to recycling facility as reviewed by Departmental Representative.

**END OF SECTION**

**PART 1 General**

**I.1 REFERENCES**

- .1 ASTM A167-99(2009) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM B32-08 - Solder Metal.
- .4 ASTM B101- 07 - Lead-Coated Copper Sheet and Strip for Building Construction.
- .5 ASTM B209M-07 - Aluminum and Aluminum-Alloy Sheet and Plate (ASTM B209-07 - Aluminum and Aluminum-Alloy Sheet and Plate).
- .6 ASTM B370-09 - Copper Sheet and Strip for Building Construction.
- .7 ASTM D2178-04 - Asphalt Glass Felt Used in Roofing and Waterproofing.
- .8 ASTM D4586-07 - Asphalt Roof Cement, Asbestos-Free.
- .9 ASTM D226-06 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- .10 CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .12 CRCA (Canadian Roofing Contractors' Association) - CRCA Specification Manual.
- .13 SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) - Architectural Sheet Metal Manual.

**I.2 SUBMITTALS FOR REVIEW**

- .1 Provide Samples as per Section 01 33 00 – Submittal Procedures

**I.3 SAMPLES**

- .1 Submit duplicate samples of full size specified prefinished aluminum. Colour to be selected by Departmental Representative from complete standard range.

**I.4 WARRANTIES**

- .1 Endorse and forward to Departmental Representative the following warranties commencing on the date of Substantial Performance.
- .2 Relative to this section, revise General Condition I.3.4 from '1 year' to '2 years'. Installers two (2) year warranty covering installation.

**PART 2 Products**

**2.1 MATERIALS**

- .1 **Items not exposed to view unless noted otherwise on drawings:**
  - .1 Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock forming quality, hot-dip galvanized steel sheet, unless otherwise indicated.

- .2 Coil-Coated Galvanized Steel Sheet: Zinc-coated, commercial-quality steel sheet conforming to ASTM A 755, G 90 (ASTM A 755M, Z 275) coating designation; not less than 22 gauge thick, unless otherwise indicated.

## 2.2 ACCESSORIES

- .1 **Isolation coating:** alkali resistant bituminous paint.
- .2 **Plastic cement:** to CGSB 37-GP-5M.
- .3 **Sealants:** in accordance with Section 07 92 10, colour selected by Departmental Representative.
- .4 **Cleats:** of same material, and temper as sheet metal, minimum 50mm wide. Thickness same as sheet metal being secured.
- .5 **Fasteners:** for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- .6 **Washers:** of same material as sheet metal, 1 mm thick with rubber packings.
- .7 **Solder:** For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- .8 **Flux:** rosin, cut muriatic acid, or commercial preparation suitable for materials to be soldered.

## 2.3 FABRICATION

- .1 Hem exposed edges on underside 12 mm. Miter and seal corners with sealant.
- .2 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

## 2.4 METAL FLASHINGS

- .1 Form flashings and copings, scuppers, pitch pockets and control joints to profiles of minimum 0.79 mm thick prefinished aluminum unless otherwise indicated.

## PART 3 Execution

### 3.1 MOCK-UP CONSTRUCTION

- .1 Construct mock-up installation in accordance with Section 01 45 00 - Quality Control and as directed by BECA.

### 3.2 PREPARATION

- .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved by Departmental Representative before installation.
- .3 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using standing seams forming tight fit over hook strips, except where otherwise shown.
- .4 Lock end joints and caulk with sealant.
- .5 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25mm. Lead wedge flashing securely into joint.
- .6 Caulk flashing at reglet and cap flashing with sealant.

**END OF SECTION**

**Part I General**

**I.1 REFERENCES**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-SI 15-1995, Fire Tests of Fire stop Systems.

**I.2 DEFINITIONS**

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

**I.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .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: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
  - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

#### **I.4 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company person specializing in fire stopping installations approved by manufacturer with 5 documented experience.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart 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.
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .2 Twice during progress of Work at 25% and 60% complete.
  - .3 Upon completion of Work, after cleaning is carried out.

#### **I.5 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 brand name, manufacturer, ULC markings.

- .2 Storage and Protection:
  - .1 Store materials 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 reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-SI 15.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-SI 15 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Service penetration assemblies: systems tested to CAN-ULC-SI 15.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-SI 15.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 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.
- .10 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.
  - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

### **3.3 INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with 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 PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

- .3 Schedule site visits, to review Work, as directed in PART I - QUALITY ASSURANCE.

### **3.6 CLEANING**

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

### **3.7 SCHEDULE**

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

**END OF SECTION**

**PART I General**

**I.1 REFERENCES**

- .1 ASTM C509-06 - Elastomeric Cellular Preformed Gasket and Sealing Material.
- .2 ASTM C834-10 - Latex Sealants.
- .4 ASTM C920-08 - Elastomeric Joint Sealants.
- .5 ASTM C1184-05 - Structural Silicone Sealants.
- .6 ASTM C1193-09 - Guide for Use of Joint Sealants.
- .7 ASTM C1311-10 - Solvent Release Sealants.
- .8 ASTM C1330-02(2007) - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
- .9 ASTM C1401-09a - Guide for Structural Sealant Glazing.
- .10 CGSB-19-GP-5M-1984 - Sealing Compound, One Component, Acrylic Base, Solvent Curing.
- .11 CGSB-19-GP-14M-1984 - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
- .12 CAN/CGSB-19.13-M87 - Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .13 CAN/CGSB-19.17-M90 - One-Component Acrylic Emulsion Base Sealing Compound.
- .15 CAN/CGSB-19.24-M90 - Multi-component, Chemical Curing Sealing Compound.

**I.2 QUALITY ASSURANCE**

- .1 Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

**I.3 ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

**I.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 35 41 - Construction Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Construction Waste Management Plan.
- .3 Dispose of unused sealant materials at official hazardous material collections site approved by Departmental Representative.
- .4 Do not dispose of unused sealant materials into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

## **PART 2 Products**

### **2.1 SEALANTS**

- .1 Acrylic Sealant (Type A): CAN/CGSB-19.17, paintable; single component, solvent curing, non-staining, non-bleeding, non-sagging. Colour to be selected by Departmental Representative.

### **2.2 ACCESSORIES**

- .1 Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- .2 Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- .3 Joint Backing: ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- .4 Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 Execution**

### **3.1 EXAMINATION**

- .1 Verify that substrate surfaces and joint openings are ready to receive work.
- .2 Verify that joint backing and release tapes are compatible with sealant.

### **3.2 PREPARATION**

- .1 Remove loose materials and foreign matter which might impair adhesion of sealant.
- .2 Clean and prime joints in accordance with manufacturer's instructions.
- .3 Perform preparation in accordance with manufacturer's instructions.
- .4 Protect elements surrounding the work of this section from damage or disfiguration.

### **3.3 INSTALLATION**

- .1 Install sealant in accordance with manufacturer's instructions.
- .2 Measure joint dimensions and size materials to achieve 2:1 width/depth ratios.
- .3 Install bond breaker where joint backing is not used.
- .4 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- .5 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

- .6 Tool joints concave.

### **3.4 CLEANING**

- .1 Clean adjacent soiled surfaces.

### **3.5 PROTECTION OF FINISHED WORK**

- .1 Protect finished installation.
- .2 Protect sealants until cured.

### **3.6 SCHEDULE**

- .1 Apply sealant type 'A' to junctures of millwork items and adjacent building components and perimeter of door frames as directed by Departmental Representative.

**END OF SECTION**