Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C553, Type 1 – Specification for Mineral Fibre Board Thermal Insulation for Commercial and Industrial Applications.

.2 ASTM C165 – Test for Measuring Compressive Properties of Thermal Insulations.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-09, Standard for Thermal Insulation, Mineral Fibre for Buildings.

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

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

Part 2 Products

2.1 INSULATION

.1 Mineral fibre (inorganic glass fibres) semi-rigid: to CAN/ULC-S702 and ASTM C165

- .1 Density: 48 kg/m^3.
- .2 Surfaces: black colour glass fibre mat on exposed face.
- .3 Thickness: 25 mm.
- .4 NRC: 0.70 (for 25mm) to ASTM C423 type A apparatus, material against a solid support.
- .5 40% minimum certified recycled materials content
- .6 Sizes: 1219mm x 2438 sheets.

2.2 ACCESSORIES

.1 Installation clips: disc type, length to suit insulation, 25 mm diameter head.

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 WORKMANSHIP

.1 Install to underside of floor slab and face of plaster covered beams in areas of dropped ceilings as indicated on drawings.

.2 Install insulation to maintain continuity of boards.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts and other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly. Use only insulation boards free from chipped or broken edges.

.6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 EXAMINATION

.1 Examine substrates and immediately inform Departmental Representative in writing of defects.

.2 Prior to commencement of work ensure:

.1 Substrates are firm, straight, smooth, dry, and clean of dust and debris.

3.4 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C553-11, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 ASTM C1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-09, Standard for Thermal Insulation, Mineral Fibre for Buildings.

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

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

Part 2 Products

2.1 INSULATION

.1 Batt and blanket mineral fibre: CAN/ULC S702, Type 1

.1 Non-combustible: to CAN/ULC S114.

.1 Flame spread: 0 to 10

.2 Smoke developed: 0 to 10

.2 Thickness: as indicated on drawings and to suit partition framing (fill cavity).

.3 Zero formaldehyde content.

.4 Acoustical performance:

.1 Airborne sound transmission loss: To ASTM E90

.2 Rating sound insulation: To ASTM E413

.3 Sound absorption co-efficients: To ASTM E423 (NRC 1.10 for 102mm thickness)

.5 Density: To ASTM C612, 45 kg/m^3

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 and to ASTM C1320.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Fill cavity to full depth for partitions and floor assemblies.

.5 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CSA-B149.1 and CSA-B149.2 Type B and L vents.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.2 ASTM D6162-00a(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.3 ASTM D6163-00(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.4 ASTM D6164/D6164M-11, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB).

.1 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 Canadian Roofing Contractors Association (CRCA).

.1 CRCA Roofing Specifications Manual-latest edition.

1.2 PERFORMANCE REQUIREMENTS

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

1.3 SUBMITTALS

.1 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.

.2 Submit manufacturer's printed product literature, specifications and data sheets

.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.4 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.1 Indicate flashing details

.5 Provide layout for tapered insulation.

.6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.7 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.8 Maintenance Manuals:

.1 Conform to Section 01 33 00 – Submittal Procedures.

1.4 STORAGE AND HANDLING

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

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

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

.4 Place plywood runways over completed Work to enable movement of material and other traffic.

.5 Store sealants at +5 degrees C minimum.

.6 Store insulation protected from daylight and weather and deleterious materials. Store at +5 degrees C minimum.

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

1.5 PROTECTION

.1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, C and C class protection. Sizes 1.14, 2.25, 4.5, 9 and 14 kg or as indicated on roof per torch applicator, within 6 m of torch applicator.

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

.3 Maintain fire watch for 1 hour after each day’s roofing operations cease.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Do not install roofing when temperature remains below manufacturers' recommendations.

.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.

1.7 COORDINATION OF WORK

.1 Coordinate installation of membranes with other trades so as to provide continuous sealing of membranes particularly where roof air barrier membrane meet wall air barrier membranes.

1.8 QUALIFICATIONS

.1 Applicator: Company specializing in performing work of this section with minimum 5 years documented experience in installation of roof systems. The roofing contractor will

supply and install materials to the acceptance of the manufacturer in order to qualify for the manufacturer's warranty.

1.9 WARRANTY

.1 Contractor shall warrant that modified bituminous roofing and membrane flashings will stay in place and remain for two years.

.2 The product manufacturer shall supply a written and signed document issued in the name of the owner. The warranty will call for the removal and replacement of the defective membrane including labour, for a non-prorated ten (10) year period starting from the date of substantial completion. The membrane warranty cannot be limited by other system components that are only available or manufactured by the membrane manufacturer. Letters modifying the manufacturers' standard warranty will not be accepted.

1.10 ROOF DESCRIPTION

.1 Modified Bituminous Membrane roofing types are indicated on drawings as follows:

.1 Roof Type 1 (R1) – Conventional, adhesive adhered, installed over sloped top layer of insulation, installed over base layer of insulation, on flat concrete deck.

Part 2 Products

2.1 INSULATION

.1 RSI: Average RSI 5.3 (R30).

.2 Type 1: Rigid Cellular Polyisocyanurate to: CAN/ULC-S704-03.

.1 Faced: to CAN/ULC C-S704-11.

.1 Closed cell polyisocyanurate foam core bonded to inorganic glass fibre reinforced faces, 2 sides per ASTM C1289 Type II, Class 1, Grade 2.

.2 Shape: flat.

.3 Thickness: 25mm and as indicated.

.4 Location: Top surface of sloped insulation and as indicated.

.3 Type 2: Expanded polystyrene (EPS): to CAN/ULC-S701.

.1 Type: 2.

.2 Thickness: as required to achieve minimum slopes and insulation values.

.3 Edges: butt edge

.4 Tapered and flat to achieve minimum slope of 2% or as indicated in drawings.

.5 Location: Top surface of roof deck and as indicated.

2.2 PREMANUFACTURED TAPERED SUMP PANEL

.1 Rigid cellular Polyisocyanurate, panels tapered to centre, size 2440 x 2440 mm, 172 KPa (25 PSI).

.1 Minimum thickness at roof drain: 25mm.

.2 Perimeter thickness: 50mm (approximately 2% slope to drain)

2.3 ADHESIVE

.1 Adhesive (for polystyrene): to CGSB 71-GP-24.

.2 Compatible with roofing membrane, polyisocyanurate and polystyrene insulation.

2.4 DECK PRIMER

.1 Primer: Elastomeric bitumen and solvent based for self-adhesive waterproofing membranes at temperatures above –10°C. To acceptance of roofing manufacturer.

.1 Bakor: 910-01

.2 Soprema: Elastocal Stick

.3 Approved alternate.

2.5 ADHESIVES

.1 Adhesive (for polystyrene): to CGSB 71-GP-24.

.2 Compatible with roofing membrane, polyisocyanurate and polystyrene insulation.

.3 Dual component urethane, solvent free, cold process roofing adhesive to acceptance of roofing manufacturer.

.1 Millennium: Weather-Tite One Step Foamable Adhesive.

.2 Soprema: Duotack Adhesive.

.3 Approved alternate.

2.6 VAPOUR RETARDER

.1 Existing protected membrane roofing may be left in place as vapour retarder. Inspect and ensure continuity of membrane and repair where conditions warrant.

.2 SBS modified bitumen, with high density cross laminated polyethylene grid top surface. Under face is self-adhesive and protected with a silicone release plastic film.

.1 Soprema: Sopravap'R.

.2 IKO: MVP Modified Vapour Protector.

.3 Approved alternate.

2.7 FIRE PROTECTION TAPE

.1 Self-adhesive fire stop membrane composed of glass fleece reinforcement and SBS modified bitumen. Install prior to torch-applied vapour retarders, base sheets or stripping membranes. Install over substrate cracks, voids, vertical abutments, panel joints and any locations subject to back drafts or entrance of flame from torch.

.1 Soprema: Sopraguard Tape.

.2 Approved alternate

2.8 MEMBRANES

.1 Roof Type 1 (R1)

.1 Base Sheet Panel: SBS modified bitumen, non-woven polyester reinforced membrane factory laminated to a high-strength, fire retardant fibreboard. The base sheet membrane is offset from the panel to provide a shiplap on two adjacent sides. Top surfaces: Thermofusible polyethylene

.2 Base sheet membrane properties: to CGSB 37-GP-56M .

.1 Soprema: Soprabase FR180

.2 IKO: Roofcraft Base 180 FR

.3 Approved alternate.

.3 Cap Sheet: Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, heavy duty reinforcement. Fully adhered torch on membrane. The cap sheet underface is covered with a plastic thermofusible film and the top face is protected by coloured granules.

.1 Cap sheet membrane: to CGSB 37-GP-56M

.1 Soprema: Sopralene Flam 250 GR

.2 IKO: Torchflex TP-250-CAP

.3 Approved alternate.

.4 Base Sheet Flashing: Styrene Butadiene Styrene elastomeric polymer, prefabricated sheet, heavy duty reinforcement, self- adhesive underface, top surface torchable polyethylene

.1 Base sheet flashing membrane: to CGSB 37 GP 56M:.

.1 Soprema: Sopraflash Flam Stick

.2 IKO: Armour Bond Flash.

.5 Cap Sheet Flashing: Styrene Butadiene Styrene (SBS) elastomeric polymer, prefabricated sheet, heavy duty reinforcement. Fully adhered torched on membrane. The cap sheet flashing underface is covered with a plastic thermofusible film and the top face is protected by coloured granules.

.1 Cap sheet flashing membrane: to CGSB 37 GP 56M.

.1 Soprema : Sopralene Flam 250 GR

.2 IKO :TP-250-CAP

.3 Approved alternate

2.9 SEALERS

.1 Sealing compound: to CAN/CGSB-37.29, rubber asphalt type, compatible with the roofing membrane and as required by membrane manufacturer.

.2 Sealants:

.1 Urethanes Two Part.

.1 Non-sag to CAN/CGSB-19.24, Type 2, Class B, colour to match adjacent surfaces.

2.10 FASTENERS

.1 Mechanical fasteners and adhesives, as recommended by manufacturer.

Part 3 Execution

3.1 WORKMANSHIP

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual Do priming for asphalt roofing in accordance with CGSB 37-GP-15M .

.2 The interface of the walls and roof assemblies will be constructed to allow for a connection point for continuity of air barrier.

3.2 EXAMINATION OF ROOF DECKS

.1 Prepare surfaces and complete waterproofing work in conformance with manufacturer’s written instructions. Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.

.2 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 Curbs have been built.

.3 Scuppers have been installed at proper elevations relative to finished roof surface.

.4 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

.1 Cover walls, walks 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 Consultant .

.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 Treat new metal connectors and decking with rust proofing or galvanization.

.8 Install self adhesive fire protection tape directly onto an approved substrate to prevent flames from penetrating into empty spaces and openings while installing heat-welded membranes.

3.4 VAPOUR RETARDER

.1 Apply primer to roof substrates as recommended by membrane manufacturer. All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible.

.2 Install the self-adhesive vapour retarder membrane in conformance with the manufacturer's recommended methods. Unroll vapour retarder membrane onto metal decking, parallel with the direction of the flutes. Ensure the metal deck surface is clean, dry, and free of any loose material. Align the longitudinal edge of the membrane with the edge of the top flute.

.3 Hold the membrane in place, remove the siliconized release film from the underside by pulling diagonally. Apply pressure with a roller to ensure positive adhesion to the surface. Install subsequent rolls in the same manner and overlap the side laps a minimum of 75 mm. Roll all laps for positive adhesion.

.4 Ensure the membrane end lap is overlapped a minimum of 150mm (6") and roll the lap for positive adhesion.

.5 Install vapour retarder membrane to vertical surfaces at perimeters, curbs, and other roof projections to permit a sealed connection with the base sheet layer. Vapour retarder extensions on vertical surfaces to be installed not more than 25mm above the level of the field base sheet membrane.

3.5 PRIMING CONCRETE DECK

.1 Apply deck primer to concrete roofing substrate at the rate recommended by manufacturer.

3.6 ROOF INSULATION

.1 Rigid Cellular Polyisocyanurate (base layer).

.1 Apply deck primer to concrete roofing substrate at the rate recommended by manufacturer.

.2 Place boards in parallel rows with ends staggered, and in firm contact with one another. Install insulation panels in a minimum of two layers to achieve required RSI value. Stagger all vertical joints between layers.

.3 Cut end pieces to suit.

.4 Refer to drawings for locations.

.2 Expanded polystyrene (EPS) (sloped top layer)

.1 Apply adhesive in conformance with manufacturer's written recommendations. Increase the rate of adhesive application at perimeters, corners and large curb areas in conformance with FM LPD 1-28.

.2 Four by four foot insulation boards are to be used. Install insulation boards as soon as adhesive has been applied to substrate. Step in boards to ensure uniform contact to substrate. If required, score boards and break to lay flat to roof surface. All vertical joints between multiple layers of insulation boards will be staggered.

.3 Install only as much insulation that can be covered the same day with base sheet.

.4 Install insulation as required to achieve roof slopes as indicated in drawings. Install tapered insulation as second insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.5 Refer to drawings for locations.

3.7 MEMBRANE ROOFING APPLICATION

.1 Roof Type 1 (R1)

.1 Application of Primer

.1 Roofing substrates of wood, metal, concrete, masonry or gypsum board surfaces will receive a coat of asphalt primer at a rate of 0.15 to 0.25 l/m2 (none required for factory-painted metals). All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible.

.2 Base Sheet Panel Installation

.1 Starting at the low point or roof drain, install the base sheet panels over the substrate or insulation layer, aligned with the edge of the roof. All the panels must be snugly fitted, without any significant differences in level. Check that all side laps are properly fitted for sealing and that all end joints are aligned in a single line for heat sealing with manufacturer’s cover strip. Along the end joints, ensure the 25mm overlap of the factory applied base sheet is properly positioned to protect the end joint during application of the cover strip.

.2 Adhere the base sheet panels to the substrate or insulation with specified adhesive, in conformance with adhesive manufacturer's written recommendations. Increase the rate of adhesive application at perimeters, corners and large curb areas in conformance with FM LPD 1-28.

.3 Seal all laps in conformance with the manufacturer’s recommended methods. For the Duo Selvedge side laps, seal the first 50mm self-adhesive portion by removing the protective release paper and rolling the lap with a steel or nylon hand roller. Ensure firm pressure is used to provide a positive seal. Then, seal the last 25mm thermofusible portion of the lap by heat welding with a torch or hot air welder. Top heat and butter the lap for a smooth finish.

.4 Complete end lap sealing by torch welding the manufacturer’s recommended cover strip over the continuous end lap joint. Use adequate heat to simultaneously melt the contact surfaces and obtain a homogenous seal. Butter all edges for a smooth finish.

.5 All vertical joints between substrate and base sheet panels will be staggered.

.3 Base Sheet Flashing Installation – Self Adhesive.

.1 Apply base sheet flashing only after primer coat is dry.

.2 Install base sheet flashing in one (1) metre widths to cover the base sheet panel a minimum of 100 mm or a minimum of 40 mm beyond roof base sheet fasteners. Remove the plastic film in this area with a torch before application of the self-adhesive membrane. Overlap side laps by 75 mm. Stagger side laps by at least 100 mm from base sheet overlaps on roof to avoid excessive layering.

.3 Install the base sheet flashing directly onto substrate by removing silicone paper cover sheet. Proceed from top to bottom and apply pressure to the membrane using an aluminium block tool. Ensure membrane is tight to angles and corners. Once in place, roll the membrane surface with a steel or rubber roller to ensure positive adherence over entire surface. Avoid forming wrinkles, air pockets or fishmouths.

.4 Once all areas have been covered and laps sealed, complete the installation by heating the laps with a torch and buttering smooth.

.4 Roofing Cap Sheet Installation – Torch Applied

.1 Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge). If starter roll is not used, side laps covered in granules must be degranulated by embedding granules in torch-heated bitumen over a 75¬mm width.

.2 Weld cap sheet onto base sheet with torch equipment recommended by membrane manufacturer. During application, simultaneously melt both contact surfaces so a bead of bitumen is apparent as cap sheet unrolls. Avoid overheating.

.3 Overlap cap sheet side laps by 75 mm and end laps by 150 mm. Cut off corners at end laps to be covered by next roll. All granule overlap surfaces must first have the granules embedded before sealing the overlap with a torch.

.4 Ensure side and end joints between the base layer panels and cap sheet are staggered by at least 300 mm. Stagger end laps between the rows of cap sheet a minimum of 300mm.

.5 Once cap sheet is installed, carefully check all overlapped joints. Ensure the installation is free of wrinkles, air pockets or fishmouths.

.5 Cap Sheet Flashing Installation – Torch Applied

.1 On the field cap sheet membrane, draw a parallel chalk line 150 mm (or 50 mm beyond the base sheet flashing) from all vertical junctions at parapets, curbs, or other roof projections. De-granulate this area by sinking the surface granules into bed of hot bitumen with torch and round-nosed trowel. Also de-granulate any granulated vertical areas to be overlapped. .

.2 Install cap sheet flashings in one (1) -metre widths. Overlap side laps by 75 mm. Stagger base and cap sheet overlaps on roof by at least 100 mm to avoid excessive layering.

.3 Torch weld cap sheet directly onto base sheet from top to bottom. Ensure adequate and even heat is applied to simultaneously melt both surfaces. Using a sponge, gently press the cap sheet membrane into place to obtain a positive contact and homogenous seal between the surfaces. .

.1 Once cap sheet is installed, carefully check all overlapped joints. Ensure the installation is free of wrinkles, air pockets or fishmouths. Care should be taken to avoid excessive bitumen bleed-out at joints.

.2 Roof Penetrations

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.8 PRE-MANUFACTURED TAPERED SUMP PANEL

.1 Install pre-manufactured tapered sump panels at each roof drain location.

.2 Adhere tapered sump panel to roof deck according to manufacturer’s written instructions.

3.9 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials (ASTM International)

.1 ASTM A653/A653M-11, 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 2012.

.3 Canadian Standards Association (CSA International)

.1 CSA B111-1974(R2003), Wire, Nails, Spikes and Staples

1.2 SAMPLES

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit duplicate 100 x 100 mm samples of each type of sheet metal material, colour and finish.

1.3 WARRANTY

.1 Contractor shall warrant that sheet metal flashings will stay in place and remain leakproof for two years.

Part 2 Products

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: 0.8 mm thickness, commercial quality to ASTM A653/A653M, with Z275 designation coating.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester finish.

.1 Stelco / Dafasco 8000 Series

.2 Colour: to match QC 18228 ‘Metro Brown.’.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Sealants: two component polyurethane, colour to match adjacent materials.

.4 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness: same as sheet metal being secured.

.5 Fasteners: of 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: of same material as sheet metal, 1 mm thick with rubber packings.

.7 Solder: to ASTM B32, alloy composition Sn .

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details as indicated.

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

.3 Hem exposed edges on underside 12 mm. 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.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 0.8mm thick prefinished steel

Part 3 Execution

3.1 METAL FLASHINGS

.1 Install sheet metal work in accordance with CRCA FL series details, FL Aluminum Sheet Metal Work in Building Construction as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed.

.4 “S-Lock” end joints and caulk with sealant.

.5 Install metal flashing under cap flashing to form weather tight junction.

END OF SECTION

Part 1 General

1.1 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-S115-05, Fire Tests of Fire stop Systems.

1.2 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 non-combustible 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.

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, 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, and cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company specializing in fire stopping installations with 5 years' experience.

.2 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 Upon completion of Work, after cleaning is carried out.

1.5 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, and ULC markings.

.2 Storage and Protection:

.1 Store materials 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.

.3 Waste Management and Disposal:

.1 Separate waste materials for reuse and 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-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 Fire stop system rating: as indicated on drawings.

.2 Re-penetrable fire stop system for power and communication cables and cable trays.

.3 Service penetration assemblies: systems tested to CAN-ULC-S115.

.4 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

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

.10 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.

.11 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 SPECIAL REQUIREMENTS

.1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:

.1 Designed for re-entry, removable at: cable trays, electrical and communication rooms.

3.5 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.

3.6 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.

3.7 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.

3.8 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^2 : 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 1 General

1.1 REFERENCES

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

.1 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.

.2 ASTM E814-13, Standard Test Method for Fire Tests of Penetration Firestop Systems.

.3 ASTM E1966-07(2011), Standard Test Method for Fire-Resistive Joint Systems.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.2 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.3 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999 (CEPA).

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

.1 Material Safety Data Sheets (MSDS).

.5 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.2 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.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 manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.

.1 Instructions to include installation instructions for each product used.

1.3 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:

.1 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 sealant 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.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

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

.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.5 Unused sealant material 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.

.6 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

.7 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations:

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

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 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 Labour Canada.

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

.3 Ventilate area of by use of approved portable supply and exhaust fans approved by Departmental Representative.

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 offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1 - Urethanes Two Part.

.1 Non-Sag to CAN/CGSB-19.24, Type 2, Class B, colour as selected by Departmental Representative from manufacturer’s standard range.

.2 Type 2 - Urethanes One Part.

.1 Non-Sag to CAN/CGSB-19.13, Type 2, MCG-2-25 or MCG-2-40, colour as selected by Departmental Representative from manufacturer’s standard range.

.3 Type 3 - Silicones One Part.

.1 To CAN/CGSB-19.13.

.2 Mildew resistant: for use in interior areas where water may contact sealant.

.4 Type 4 - Acrylic Latex One Part.

.1 To CAN/CGSB-19.17.

.5 Type 5 - Acoustical Sealant.

.1 To ASTM C919.

.6 Type 6 – Acoustical Sealant and Firestopping.

.1 To ASTM E-814 and ASTM E-1966.

.2 Acceptable material: Metacaulk MC-150+.

2.3 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^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.4 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): Sealant type: 1 or 2.

.2 Control and expansion joints in exterior surfaces of unit masonry and stone veneer walls: Sealant type: 1 or 2.

.3 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: 4.

.4 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: 1 or 2.

.5 Perimeters of interior frames, as detailed and itemized: Sealant type: 4.

.6 Exposed interior control joints in drywall: Sealant type: 4

.7 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, water closets, basins, vanities): Sealant type: 3.

.8 Perimeter of countertop edges: Sealant type: 3 (translucent)

.9 Acoustic seal for sound rated walls: Sealant type: 5

.10 Acoustic seal and firestopping: Sealant type: 6

.11 In additional locations as noted on the drawings: confirm with Departmental Representative.

2.5 JOINT CLEANER

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

.2 Primer: as recommended by manufacturer.

Part 3 Execution

3.1 PROTECTION

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

3.2 SURFACE PREPARATION

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

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

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

.4 Ensure joint surfaces are dry and frost free.

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

3.3 PRIMING

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

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

3.4 BACKUP MATERIAL

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

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

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

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

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

END OF SECTION