

DIVISION 07

**THERMAL AND MOISTURE
PROTECTION**

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 07 21 13 – Board Insulation.
- .2 Section 07 90 00 – Joint Sealers.

1.2 REFERENCES

- .1 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 QUALITY ASSURANCE

- .1 Applicator qualifications: approved and trained by membrane manufacturer and having minimum 5 years experience in installation of waterproofing membranes on projects of similar size. If requested, submit proof of experience to Contract Administrator.
- .2 Manufacturer's representative:
 - .1 Inspect substrate prior to commencement of work, during application of membrane and upon completion.
 - .2 Provide technical assistant to applicator and assist where required to correct installation of membrane.

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: Manufacturers printed product literature, specifications and application instructions for waterproofing materials.
- .3 Samples: duplicate 100 x 100 mm size samples of waterproofing membrane proposed for use on this project.

1.5 COORDINATION

- .1 Coordinate delivery and application of waterproofing materials with work covering waterproofing to minimize exposure to elements or damage.
- .2 Coordinate installation of waterproofing membrane with building air barrier membrane. Overlap and seal to air barrier membrane to ensure continuity over building substrate.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Maintain air temperature and structural base temperature at installation area above membrane manufacturer's recommendations before, during and 72 hours after installation.
- .2 Do not apply membrane to frozen, wet or damp surfaces.
- .3 For applications in freezing weather do not commence application until authorized by membrane manufacturer.
- .4 For enclosed applications ensure adequate forced air circulation during curing period.
- .5 Install membrane on dry substrates, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture beneath waterproofing membrane.

1.7 DELIVERY, STORAGE, HANDLING

- .1 Deliver materials to site in original unopened packaging with all labels intact.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of membrane in upright position, with selvage edge up.
- .4 Remove only in quantities required for same day use.
- .5 Store sealants at +5°C minimum.

Part 2 Products

2.1 MATERIALS

- .1 Waterproofing membrane: self-adhesive, modified bitumen prefabricated sheet, non-woven polyester reinforcing, 1.5 mm thick (minimum), top surface polyethylene film, bottom surface polyethylene release sheet.
 - .1 Acceptable material: WR Grace Bituthene 3000, Soprema Colphene 3000, W.R. Meadows Mel-Rol, IKO Aquabarrier FP, Bakor Blueskin WP 200.
- .2 Primer: type recommended by manufacturer, applicable for substrate, water based. Solvent based primer is acceptable only when ambient and surface temperatures are below manufacturer's specifications for water based primers.
- .3 Mastic sealant: type recommended by manufacturer, compatible with membrane.
- .4 Liquid sealing membrane: type recommended by manufacturer, compatible with membrane.
- .5 Protection board: insulating fiberboard: to CAN/ULC-S706, Type I, square edge, board size 1220 x 2440 mm x thickness indicated.

Part 3 Execution

3.1 INSPECTION

- .1 Inspect substrates and site conditions to ensure acceptability for application of waterproofing membranes.
- .2 Notify Contract Administrator, in writing, of unsuitable surfaces or working conditions.
- .3 Commencement of work implies acceptance of surfaces and working conditions.

3.2 PREPARATION

- .1 Clean substrates of snow, ice, loose particles, oil, grease, dirt, curing compounds or other foreign matter detrimental to application of waterproofing.
- .2 Ensure concrete surfaces are fully cured and dry using test methods recommended by membrane manufacture.
- .3 Repair defects in concrete surfaces such as spalled or poorly consolidated areas. Remove sharp protrusions and form lines.
- .4 Patch rough areas with a well-adhered parge coat to provide smooth surface. Allow parging to cure and dry before applying primer or membrane.

3.3 PRIMING

- .1 Prime all substrates to receive waterproof membrane.
- .2 Apply primer in accordance with manufacturer's instructions at recommended rate of application.
- .3 Do not apply to frozen or damp surfaces. Apply only when air and surface temperatures are within manufacturer's recommended limits.
- .4 Avoid pooling of primer and allow primer to cure until tack-free.
- .5 Prime only the area to be covered with membrane in a working day. Re-prime areas that are not covered with waterproofing within 24 hours of application of primer.

3.4 MEMBRANE APPLICATION

- .1 Apply membrane in accordance with manufacturer's instructions and with good construction practice to maintain continuity of waterproofing over building elements.
- .2 Place membrane in position without stretching, taking care to avoid trapped air, creases or fish mouths.
- .3 Ensure membrane is totally bonded to substrate.
- .4 Overlap side laps minimum 75 mm, and end laps minimum 150 mm. Stagger end laps minimum 300 mm in adjacent rows.
- .5 As installation progresses roll membrane with hand roller to ensure positive bond.
- .6 Vertical surfaces:
 - .1 Apply membrane vertically in longest possible lengths to reduce number of end joints.
 - .2 At end laps overlap upper sheet over lower sheet shingle fashion to ensure shedding of water.
- .7 Terminations:
 - .1 Seal horizontal and vertical terminations by applying heavy pressure to edges with a roller to ensure positive bond.
 - .2 Apply a continuous bead of mastic sealant to all terminations. Make watertight.
 - .3 Seal daily terminations with mastic sealant.
- .8 Corners:
 - .1 At internal corners, both vertical and horizontal, provide a fillet strip formed of liquid membrane. Do not use Fibre or wood cants.
 - .2 Provide fillet strip at junction of foundation walls with footings.
 - .3 Remove sharp or protruding edges from external corners prior to application of membrane.
 - .4 Reinforce external and internal corners with cushion strip of membrane minimum 300 mm wide at each corner. Install cushion strip below main membrane.
- .9 Joints:
 - .1 Reinforce control joints, construction joints, and joints at changes in building substrate with application of minimum 150 mm wide strip of waterproofing membrane centered over joint.
- .10 Overlap and seal waterproofing membrane to air barrier membranes to maintain continuity of building air/vapour barrier system over building envelope.

3.5 PROTECTION BOARD

- .1 Install protection board against all waterproofing membranes that are not covered and protected by board insulation.
- .2 Install boards vertically without fasteners or adhesives.
- .3 Install protection board during backfilling operations to allow backfill materials to hold protection board tight to waterproofing membrane.

3.6 INSPECTION AND REPAIR

- .1 Inspect membrane thoroughly before covering and make corrections immediately.
- .2 Patch and repair misaligned or inadequately lapped seams, tears, punctures or fish mouths. Patch with piece of waterproofing membrane and extend minimum 150 mm in all directions from fault and seal edges with mastic sealant.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Gas Association (CGA)
 - .1 CAN/CGA-B149.1, Natural Gas Installation Code.
 - .2 CAN/CGA-B149.2, Propane Installation Code.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP-24, Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604, Type A Chimneys.
 - .2 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .3 CAN/ULC-S704, Thermal Insulation, Urethane and Isocyanurate, Boards, Faced.
 - .4 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings.

Part 2 Products

2.1 INSULATION

- .1 Extruded polystyrene (XPS): to CAN/ULC-S701: Type 4, compressive strength 210 kPa. Board size 600 x 2400 x thickness indicated. Edges shiplapped; or square edge where installed between wood strapping.
- .2 Rigid cellular polyisocyanurate (ISO), faced: to CAN/ULC-S704: Type 1, Class 1. Polyisocyanurate core glass fibre reinforced. Facers reflective foil facer and non-reflective back. Board size: 1200 x 2400 x thickness indicated. Edges square. Flame spread classification: less than 500.

2.2 ACCESSORIES

- .1 Protection Board: Insulating fibreboard: to CAN/ULC-S706, Type I, 1200 x 2400 x thickness indicated.
- .2 Adhesive (for polystyrene): to CGSB 71-GP-24, Type II.
- .3 Concrete/masonry anchor: plastic anchor for attaching insulation boards with integral large head.
 - .1 Acceptable material: Hilti IDP Insulation Anchor System or approved equal in accordance with B7.
- .4 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm (26 gauge) thick, sheet metal, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine substrates and immediately inform Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure substrates are firm, straight, smooth, dry, free of snow, ice or frost, and free of dust, debris, oil, grease, and foreign material.

3.2 WORKMANSHIP

- .1 Install insulation after building substrate materials are cured and dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Coordinate installation with work of other trades.
- .4 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .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 CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.
- .6 Cut and trim insulation neatly to fit spaces.
- .7 Install insulation boards in parallel rows. Butt joints tightly, offset vertical joints.
- .8 Offset both vertical and horizontal joints in multiple layer applications.
- .9 Interlock boards at corners.
- .10 Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .11 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide strip of air barrier membrane over expansion and control joints using compatible adhesive before application of insulation.

3.3 INSTALLATION

- .1 Fasteners:
 - .1 Install masonry anchors in accordance with manufacturer's instructions.
 - .2 Provide a minimum of four anchors per 600 x 1200 mm of insulation board.
 - .3 Provide additional anchors spaced at 300 mm on centre around perimeter of openings, corners and abutments.
 - .4 Use nailing discs
 - .5 Ensure fasteners securely seated and solidly anchored. Replace loose fasteners or provide additional fastener adjacent to loose fasteners.
- .2 Insulation Adhesive
 - .1 Ensure substrate is sound, smooth, clean, and dry.
 - .2 Clean and prepare substrate and apply adhesives in accordance with manufacturer's instructions, using proper trowels and tools.
 - .3 Bead method: apply adhesive in 12 mm diameter beads at 150 mm on centre serpentine pattern.
 - .4 Notched trowel method: apply adhesive using notched trowel having 4.5 mm notches. Spread adhesive full coverage of insulation board.
 - .5 Press insulation boards onto substrate with firm hand pressure to ensure full bond.
- .3 Masonry Cavity Walls
 - .1 Install boards horizontally between masonry ties, with horizontal joints centred on ties.
 - .2 Install plastic insulation clips over masonry ties to hold insulation tight to backup wall.

3.4 SCHEDULE

- .1 Exterior walls above grade:
 - .1 Insulation: ISO
 - .2 Installation: behind masonry veneer plastic insulation supports over masonry ties. Elsewhere insulation adhesive or fasteners and nailing discs.
- .2 Parapets:
 - .1 Insulation: ISO.
 - .2 Installation: fasteners and nailing discs.
- .3 Frost barrier:
 - .1 Insulation: XPS.
 - .2 Installation: install boards loose on sand leveling bed with tight butt joints. Cover with protection board.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 13 52 – Waterproofing: Modified Bituminous Sheet

1.2 REFERENCES

- .1 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

1.3 STORAGE AND HANDLING

- .1 Store panels on pallets placed over flat, level surface. Protect panels from weather by storing in indoor dry area or with tarps until required for installation.
- .2 Protect panels from damage during transportation, storage, and handling.

Part 2 Products

2.1 MATERIALS

- .1 Extruded polystyrene insulation: to CAN/ULC-S701, Type 4.
- .2 Concrete faced insulated (CFI) panels: extruded polystyrene board insulation, Type 4, faced with factory applied 8 mm thick latex modified concrete facing. Panel size 610 x 1229 mm with tongue-and-groove edge along 1229 mm edge. Insulation thickness 102mm.
 - .1 Acceptable material: Concrete Faced Insulated (CFI) Wall Panels as manufactured by T. Clear Corporation, www.tclear.com or Tech-Crete www.tech-crete.com or approved alternate.
- .3 Mounting clips: purpose made of galvanized sheet steel, for concealed fastening of panels. As supplied by panel manufacturer.
- .4 Ledger: galvanized steel angle, of sufficient width and thickness to support panels. As supplied by panel manufacturer.
- .5 Sheet metal flashings: fabricated of galvanized sheet steel, manufacturer's standard profiles.
- .6 Prefinished metal inside and outside corner trims to match concrete facing colour.
- .7 Screw fasteners: type recommended by panel manufacturer, corrosion resistant.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine substrates and immediately inform the Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust, debris, oil, grease, or foreign materials.
- .3 Remove irregularities or jagged surfaces.

3.2 INSTALLATION

- .1 Install panel after building substrate materials are cured and dry.
- .2 Install panels to maintain continuity of thermal protection to building elements and spaces.
- .3 Coordinate installation with work of other trades.
- .4 Install CFI panels in accordance with manufacturer's instructions using only manufacturer recommended mounting clips, fasteners, flashings and other accessories.
- .5 Use only sound undamaged panels free from cracks, chips, soiling or other damage detrimental to appearance or performance.
- .6 Perimeter foundations:
 - .1 Install CFI panels horizontally.
 - .2 Trim concrete from face of panel where concrete conflicts with steel masonry shelf angles. Slide CFI panel behind steel masonry shelf angles.
 - .3 Install CFI panels with concealed mounting clips, spaced to manufacturer's specifications, at top and bottom of CFI panels.
- .7 Install panels plumb, level, straight and aligned. Fit panel joints snug and flush.
- .8 Mitre all corners.
- .9 Use full sized panels as much as possible.
- .10 Where partial panels are required cut panels with masonry saw providing neat, clean edge.
- .11 Secure partial panels with surface fasteners. Keep fasteners minimum 50 - 75 mm from panel edges.
- .12 Fit panels tight to electrical boxes, pipes, other penetrations, and around openings. Caulk or flash to seal.
- .13 Interlock boards at corners. Install metal flashing at outside corners to conceal exposed core.
- .14 Install cap flashing where panels terminate. Ensure positive drainage of moisture.
- .15 Use only panels free from chipped or broken edges.
- .16 Do not continue panels over building expansion joints. Terminate panels both sides of joint and flash or caulk to seal panel edges.

3.3 INSPECTION AND REPAIR

- .1 Inspect completed installation to ensure panels have been properly installed and solidly secured to building structure.
- .2 Replace panels that show cracks, chips, soiling or other damage with new undamaged panels.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 National Air Barrier Association (NABA)
 - .1 Quality Assurance Program.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data for materials proposed for use on project. Include manufacturer's printed instructions for installation.

1.3 QUALITY ASSURANCE

- .1 Applicators qualifications: approved and trained by membrane manufacturer. Upon request, submit proof of experience and qualifications.
- .2 Manufacturer's representative shall provide on-site inspection, technical assistance and application instructions to ensure proper installation of air barrier membrane. Contractor shall include all costs for manufacturer's inspection in his bid price.

1.4 COORDINATION

- .1 Coordinate delivery and installation of air barrier materials with work of other trades to minimize exposure of membrane to elements or damage.
- .2 Coordinate installation of air barrier membrane with work of other trades. Overlap and seal air barrier with air barriers and vapour retarders installed by other trades to ensure continuity of building air and vapour seal over entire building envelope.

1.5 DELIVERY STORAGE, HANDLING

- .1 Deliver materials to site in original unopened packaging with all labels intact.
- .2 Protect materials from weather, store on raised platforms, and cover with waterproof coverings. Do not double stack pallets.
- .3 Do not store materials at continuous temperatures above 38°C.

Part 2 Products

2.1 MATERIALS

- .1 Self-adhesive air barrier membrane: modified bitumen on high-density polyethylene film, with silicone release paper on adhesive side, nominal thickness 1.5 mm.
 - .1 Acceptable material: Soprema Sopraseal Stick 1100, Bakor Blueskin SA, WR Grace Perm-A-Barrier, IKO Aquabarrier AVB, W.R. Meadows Air-Shield.
- .2 Primers: as recommended by manufacturer and suitable for substrate.
- .3 Mastics and sealants: as recommended by manufacturer, suitable for substrate. Use water base low VOC materials wherever possible.
- .4 Flashing and stripping membranes: as recommended by air barrier membrane manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that surfaces and site conditions acceptable and ready for waterproofing application.
- .2 Ensure work penetrating waterproofing membrane is complete.

3.2 PREPARATION

- .1 Clean substrates of all snow, ice, loose particles, oil, grease, dirt, curing compounds, or other foreign matter detrimental to installation and bonding of air barrier membrane.
- .2 Repair defects in concrete and masonry surfaces such as mortar droppings spalled or poorly consolidated areas, honeycombing. Patch rough areas with a well-adhered parge coat to provide smooth surface. Allow to fully cure and dry.

3.3 INSTALLATION

- .1 Install materials in accordance with manufacturer's instructions using only materials approved for use with their products.
- .2 Apply with good construction practice to maintain continuity of air barrier membrane over building elements.
- .3 Roll out sheets and press firmly to substrate. As installation progresses roll with hand roller to ensure positive bond.
- .4 At internal corners, both vertical and horizontal, provide a fillet strip formed of liquid mastic. Do not use fibre or wood cants.
- .5 Use largest lengths possible to minimize joints. Overlap side and end laps minimum 50 mm. Stagger end laps minimum 300 mm in adjacent rows.
- .6 Locate end joints minimum 300 mm from internal and external corners.
- .7 Masonry cavity walls:
 - .1 Install sheets horizontally between masonry ties penetrating membrane. Overlap horizontal joints minimum 50 mm. Slit membrane at each tie, seal and make airtight.
 - .2 Where masonry ties are to be installed after installation of air barrier use 1 m wide rolls.
- .8 Expansion and control joints:
 - .1 Maintain continuity of air barrier membrane at expansion and control joints in substrates.
 - .2 Locate lap joints minimum 300 mm from joint.
 - .3 Continue membrane over joint. Apply an additional layer of membrane over the joint, extending minimum 300 mm on both sides of joint.
- .9 Seal with mastic all difficult detail areas that do not allow easy installation of membrane. Make airtight.
- .10 At rough openings cut air barrier membrane to form opening. Return membrane into opening and seal to rough bucks. Reinforce corners with additional piece of membrane cut and formed to seal corners.
- .11 Sheet metal transition flashings:
 - .1 Install sheet steel transition flashings and stripping where indicated.

- .2 Secure to substrates with screws or roofing nails at 300 mm on centre. Apply continuous bead of sealant under metal flashings before securing. Overlap end laps minimum 75, provide continuous bead of sealant, and secure with fasteners.
- .3 Apply recommended primer to metal surfaces before application of air barrier membrane.
- .12 Overlap and seal air barrier membrane to other air/vapour barriers and waterproofing membranes. Maintain continuity of building air/vapour barrier system over building envelope.

3.4 PATCHING AND REPAIRING

- .1 Inspect membrane for defects and poor workmanship before covering and make corrections immediately.
- .2 Ensure full contact and bond to substrates. Patch and repair loose or poorly bonded areas.
- .3 Patch and repair misaligned or inadequately lapped seams, tears, punctures or fishmouths to the satisfaction of the Contract Administrator.
- .4 Patch cuts, tears, and punctures by bonding an additional layer of air barrier membrane over damaged area. Patch shall extending minimum 150 mm in all directions from fault. Seal and make airtight.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Sheet metal flashing and trim: Section 07 62 00.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 1177/C1177M, Specification for Glass Mat Gypsum Substrate for Use as a Sheathing.
- .2 Canadian Roofing Contractors Association (CRCA)
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-56, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .4 Underwriters Laboratories Canada (ULC)
 - .1 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .5 Factory Mutual (FM Global)
 - .1 Standard 4470, Class 1 Roof Coverings.

1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: provide product data sheets for all roofing materials, to describe physical properties, product installation, including installation techniques, restrictions, limitations and other manufacturer recommendations.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Roofing contractor: must be a member in good standing of the Roofing Contractors Association of Manitoba and the Canadian Roofing Contractor's Association.
 - .2 Workers: workers performing roofing work must be skilled and employed by a company recognized and trained as an approved applicator by the roofing materials manufacturer, and must have in their possession proof of their participation in the training course run by the roofing manufacturer for the specified products.
- .2 Compatibility: ensure compatibility between components of roofing system. Provide written declaration to Contract Administrator stating that materials and components, as assembled in system, meet this requirement.

1.5 STORAGE AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt 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 work to enable movement of material and other traffic.
- .5 Store caulking at +5°C minimum.

- .6 Store insulation protected from daylight and weather and deleterious materials.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install roofing when temperature remains manufacturers' recommendations.
- .2 Minimum temperature for solvent-based adhesive is -5°C.
- .3 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 PROTECTION

- .1 Fire Extinguishers: maintain one 10 lb. fire extinguisher per torch applicator on roof, within 10 m of torch applicator.
- .2 Maintain fire watch for 1 hour each day after roofing operations cease. Use an electronic thermometer to check for hot spots.

Part 2 Products

2.1 MANUFACTURERS

- .1 Use materials from same manufacturer.

2.2 DECK COVERING

- .1 Glass Mat, Gypsum Board: to ASTM C1177/C1177M, water resistant treated core, glass matt facing, thickness indicated.
 - .1 Acceptable material: GP Gypsum DensDeck.

2.3 DECK PRIMER

- .1 Deck Primer: Soprema Elastocol Stick, IKO Aquabarrier

2.4 VAPOUR RETARDER

- .1 Self-adhesive, modified bitumen sheet.
 - .1 Acceptable material: Sopreme Sopravap'R., IKO MVP
- .2 Vapor retarder continuity strip: vapor retarder sheet, for installation beneath upstands and parapets and at wall junctions to ensure vapor barrier continuity.

2.5 ROOFING MEMBRANES

- .1 Base sheet: to CGSB 37-GP-56, SBS elastomeric polymer, prefabricated sheet, glass/polyester reinforcement. Top surface thermofusible plastic film, bottom surfaces partially self-adhesive:
 - .1 Acceptable material: Soprema Colvent Base 810, IKO Armourvent
- .2 Cap sheet: to CGSB 37-GP-56, SBS elastomeric polymer, prefabricated sheet, glass/polyester reinforcement. Top surface highly reflective granular, bottom surface thermofusible plastic film.
 - .1 Acceptable material: Soprema Soprastar HD GR., IKO Torchflex TP-250-Cap.
- .3 Base sheet flashing membrane (stripping): Base sheet: to CGSB 37-GP-56, SBS elastomeric polymer, prefabricated sheet, glass/polyester reinforcement. Top surface thermofusible plastic film, bottom surface self-adhesive:
 - .1 Acceptable material: Soprema Sopraflash Flam Stick, IKO Armourbond Flash

- .4 Cap sheet flashing membrane (stripping): same as cap sheet.

2.6 ROOFING INSULATION

- .1 Board insulation: rigid cellular polyisocyanurate (ISO):
 - .1 Acceptable material: Soprema Colgrip A., IKOTherm III with coated glass fibre facer
- .2 Tapered shapes: extruded polystyrene (EPS) to CAN/ULC-S701, type 2, cut to tapered shape for slopes indicated.

2.7 ACCESSORIES

- .1 Insulation adhesive: Soprema Coltack.
- .2 Fasteners: deck covering to deck, insulation to deck: fasteners and plates must meet Factory Mutual 4470 Standard for wind uplift and corrosion resistance.
- .3 Mastic sealant: Soprema Sopramastic ALU.
- .4 Pitch pocket filler: Soprema Mammoth Pitch Pocket Filler.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual and to FM I-90, except where specified otherwise
- .2 Do priming for asphalt roofing in accordance with manufacturer's instructions.

3.2 PROTECTION

- .1 Cover walls and adjacent work where materials hoisted or used.
- .2 Clean off drips and smears of bituminous material immediately.
- .3 Protect roof from traffic and damage. Comply with precautions deemed necessary by the Contract Administrator.
- .4 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.

3.3 EXAMINATION OF ROOF DECKS

- .1 Examine roof decks and immediately inform Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.
 - .2 Curbs have been built.
 - .3 Roof drains 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.

3.4 VAPOUR RETARDER (STEEL DECK)

- .1 Install self-adhesive vapour retarders to primed substrates in accordance with manufacturer's instructions. Ensure membrane is fully bonded to substrates and is free of air pockets, wrinkles, tears and fishmouths.
- .2 Overlap adjacent membranes by 75 mm, and end laps by 150 mm. Stagger end laps by at least 300 mm.

3.5 EXPOSED MEMBRANE ROOFING APPLICATION

- .1 Insulation: mechanically fastened application.
 - .1 Mechanically fasten insulation using screws and pressure distribution plates. Number and pattern of screws per board to meet Factory Mutual I-90 requirements.
 - .2 Place boards in parallel rows with ends staggered, and in firm contact with each other. Stagger joints between layers.
 - .3 Cut end boards to suit.
- .2 Base sheet membrane: self-adhesive application.
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheets in parallel strips, overlapping each sheet 75 mm at side joints and minimum 25 mm for end laps.
 - .2 Peel release paper and bond membrane to substrate.
 - .3 Remove paper from selvedge edge and seal with hot trowel.
 - .4 Seal the end joints by welding a 300 mm wide protection band centred on the joint.
 - .5 Application to be free of blisters, wrinkles and fishmouths.
 - .6 Perform membrane application in accordance with manufacturer's recommendations.
- .3 Cap sheet membrane: fully adhered, torch-on application.
 - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
 - .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
 - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Stagger end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
 - .4 Stagger joints between cap sheet and base sheet.
 - .5 Cover bleed-out at joints with color matched granules. Make joints inconspicuous in final assembly.
 - .6 Application to be free of blisters, fishmouths and wrinkles.
 - .7 Perform membrane application in accordance with manufacturer's recommendations.

3.6 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 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A653/A653 M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B32, Specification for Solder Metal.
- .2 Canadian Standards Association (CSA)
 - .1 CSA A123.3, Asphalt or Tar Saturated Roofing Felt.
 - .2 CSA B111, Wire Nails, Spikes and Staples.
 - .3 CAN/CSA-S136, North American Specification for the Design of Cold-Formed Steel Structural Members
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
- .4 Canadian Roofing Contractors Association (CRCA).
 - .1 Roofing Specifications Manual.
- .5 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 Manufacturers' Standard Gauge (MSG)

1.2 QUALITY ASSURANCE

- .1 Nominal base steel thickness: nominal base steel thickness of sheet steel specified in this section is based on the Manufacturers Standard Gauge (MSG) system of Canada. The minimum thickness shall be the design thickness (nominal base steel thickness) minus the maximum allowable under-tolerance specified by CAN/CSA-S136.

1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: provide product data sheets for all roofing materials, to describe physical properties, product installation, including installation techniques, restrictions, limitations and other manufacturer recommendations.

Part 2 Products

2.1 SHEET METAL MATERIALS

- .1 Zinc coated steel sheet: commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.2 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CGSB 37-GP-5.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32; asphalt laminated 3.6 to 4.5 kg kraft paper; No. 15 perforated asphalt felt to CSA A123.3.
- .4 Sealants: as specified in Section 07 90 00 – Joint Sealers.

- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .6 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.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .9 Touch-up paint: as recommended by metal flashing and trim manufacture.

2.3 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series specifications and 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.

2.4 METAL FLASHINGS

- .1 Form parapet flashings, cap flashings, copings and fascias to profiles indicated of 0.759 mm (22 MSG) prefinished steel sheet. Color TBD.
- .2 Form counter flashings, curb flashings to profiles indicated of 0.607 mm (24 MSG) galvanized steel sheet. Color TBD.
- .3 Form air/vapor barrier transition flashing at roof/wall junction to profiles indicated of 0.455 mm (26 MSG) galvanized steel sheet.

2.5 SCUPPERS AND RAINWATER LEADERS

- .1 Form scuppers and downspouts from 0.759 mm (22 MSG) prefinished steel sheet metal, to sizes and profiles as indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Install sheet metal work in accordance with CRCA details and as indicated.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Insert metal flashing under cap flashing to form weathertight junction.
- .7 Caulk flashing at cap flashing with sealant.

3.2 TRANSITION FLASHING AT ROOF/WALL JUNCTION

- .1 Install transition flashing at roof/wall junction as component of building envelope air and vapor barrier system.
- .2 Overlap joints minimum 50 mm and seal with joint sealant to provide air and vapour seal.
- .3 Secure in place with flat head nails or screws and seal fastener heads with joint sealant to provide air and vapour seal.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 834, Standard Specification for Latex Sealants.
 - .2 ASTM C 920, Standard Specification for Elastomeric Joint Sealants.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing.
 - .2 CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Chemical Curing.

1.2 SUBMITTALS

- .1 Provide color samples or color charts of standard color selection for each type of sealant.
- .2 Submit product data for each type of sealant proposed for use on this project, listing manufacturer, sealant type, consensus standards.

1.3 DELIVERY, STORAGE, AND HANDLING

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

1.4 ENVIRONMENTAL AND SAFETY REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safety data sheets 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.

Part 2 Products

2.1 SEALANT MATERIAL DESIGNATIONS

- .1 Urethane One Part, Non-Sag:
 - .1 To ASTM C 920, Type S, Grade NS, Class 25; CAN/CGSB-19.13, Type 2.
 - .2 Joint movement: $\pm 25\%$.
 - .3 Acceptable material: Sikaflex 1a, DyMonic, Chem-Calk 900, Vulkem 931.
- .2 Urethane, One Part, Self-Leveling:
 - .1 To ASTM C 920, Type S, Grade P, Class 25; CAN/CGSB-19.13, Type 1.
 - .2 Joint movement: $\pm 25\%$
 - .3 Acceptable material: Sikaflex 1C SL, Chem-Calk 950, Vulkem 45.
- .3 Acrylic, One Part.
 - .1 To CGSB 19-GP-5M.
 - .2 Acceptable material: Mono 555, Sternson Acryflex, PRC PR 12-100, Mulco 20 Year Acrylic, Chem-Calk 600.

- .4 Silicone, One Part, Mildew Resistant.
 - .1 To ASTM C 920, Type S, Grade NS, Class 25.
 - .2 Acceptable material: Dow Corning 786, GE Sanitary 1702.
- .5 Acoustical Sealant.
 - .1 To ASTM C 834.
 - .2 Acceptable material: Tremco Tremflex 834, Chem-Calk 600.

2.2 ACCESSORIES

- .1 Foam backer rods: extruded polyethylene foam, compressible, oversized 30 to 50%.
- .2 Adhesives: type recommended by expanding foam sealant manufacturer.
- .3 Bond breaker tape: polyethylene bond breaker tape that will not bond to sealant.
- .4 Expanding foam sealant – below grade applications:
 - .1 High-density open cell polyurethane foam, pre-compressed, impregnated with water-based, polymer-modified asphalt.
 - .2 Three part system with foam seal, epoxy adhesive and topcoat (where used as primary seal).
 - .3 Location: primary seal for expansion joints below grade.
 - .4 Acceptable material: Emseal 20H System.
- .5 Expanding foam sealant – above grade applications:
 - .1 High-density open cell polyurethane foam, pre-compressed, impregnated with water-based, stabilized acrylic, self-adhesive. Requires primary seal of wet caulking.
 - .2 Location: secondary seal for vertical expansion joints above grade that are less than 13 mm wide.
 - .3 Acceptable material: Emseal Greyflex.
- .6 Expanding foam sealant – above grade applications:
 - .1 High-density open cell polyurethane foam, pre-compressed, impregnated with water-based, stabilized acrylic, self-adhesive. Factory applied external colour facing of Dow Corning 790 silicone in colour selected by the Contract Administrator.
 - .2 Location: primary seal for vertical expansion joints above grade that are 13 mm or wider.
 - .3 Acceptable material: Emseal Colorseal.
- .7 Primers: type recommended by sealant manufacturer, for appropriate sealant and corresponding substrate.
- .8 Joint cleaner: non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

2.3 SEALANT SELECTION

- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): Sealant type: Urethanes One Part, Non-Sag.
- .2 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: Urethanes One Part, Non-Sag.
- .3 Coping joints and coping-to-facade joints: Sealant type: Urethanes One Part, Non-Sag.
- .4 Cornice and wash (or horizontal surface joints): Sealant type: Urethanes One Part, Self-leveling.

- .5 Exterior joints in horizontal wearing surfaces (where shown): Sealant type: Urethanes One Part, Self-leveling.
- .6 Perimeters of exterior openings on interior of building where frames meet interior finishes: Sealant type: acrylic one part.
- .7 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: Urethanes One Part, Non-Sag.
- .8 Perimeters of interior frames: Sealant type: acrylic one part.
- .9 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type: acrylic one part.
- .10 Joints at tops of non-load bearing masonry walls at the underside of poured concrete: Sealant type: acrylic one part.
- .11 Under thresholds at exterior doors. Sealant type: acrylic one part.

Part 3 Execution

3.1 PROTECTION

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

3.2 PREPARATION OF JOINT SURFACES

- .1 Before commencing application of sealants test materials for indications of staining or poor adhesion.
- .2 Ascertain that sealers and coatings applied to sealant substrates are compatible with sealant used and that full bond between the sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and bond, if necessary.
- .3 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .4 Clean bonding joint surfaces of deleterious substances including dust, rust, oil grease, and other matter that may impair work.
- .5 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.
- .6 Ensure joint surfaces are dry and frost free.
- .7 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 foam backer rod to achieve correct joint depth and shape, with approximately 30% compression.

END OF SECTION