

BUILDING INSULATION

1. GENERAL

1.1 Delivery, Storage, and Handling

- .1 Deliver materials to Site in their original wrappings with labels intact.
- .2 Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to UV exposure.
- .3 Store materials inside buildings for twenty four (24) hours prior to installation.

2. PRODUCTS

2.1 Materials

- .1 Perimeter Insulation: CAN/ULC S-701 Type 4, expanded, extruded polystyrene board insulation, minimum compressive strength of 210 kPa (30 psi) at 10% deformation or yield; square edges, unfaced, Styrofoam SM by Dow Chemical Canada Inc.
- .2 Concrete Slab Insulation: CAN/ULC S-701 Type 4, expanded, extruded polystyrene board insulation, minimum compressive strength of 415 kPa (60 psi) at 10% deformation or yield; square edges, unfaced, Styrofoam Highload 60 by Dow Chemical Canada Inc.
- .3 Cavity Wall Insulation: CAN/ULC S701 Type 3, expanded, extruded polystyrene board insulation, minimum compressive strength of 170 kPa (25 psi) at 10% deformation or yield; square edges; unfaced, Styrofoam Cavitymate Ultra by Dow Chemical of Canada Ltd.
- .4 Roll or Batt Wall Insulation: Preformed glass fibre batt insulation, CSA A101-M, 17.5 kg/m³ (1.1 pcf) density.
- .5 Adhesive: Compatible to and as recommended by manufacturer of insulating materials.
- .6 Cement Mortar Mix: 1 part Portland cement, 6 part masonry sand, 1 part hydrated lime, potable water to produce a workable mix.
- .7 Mechanical Fasteners
 - .1 Insulation Clips: Impale type, perforated 50 x 50 mm (2" x 2") cold rolled steel adhesive back, spindle of length to suit insulation plus 25 mm (1") with speed washers.
 - .2 Nails: Galvanized steel, length 25 mm (1") longer than insulation thickness, CSA B111 Table 12.
 - .3 Staples: Galvanized wire, 12 mm (¹/₂") minimum.

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- .8 Lightweight Cement Board: Panels of Portland cement slurry with a fully embedded alkali resistant glass fiber mesh facing, Unipan, Uniflex or PermaBase from Unifix inc., or Durock by CGC.

3. EXECUTION

3.1 Preparation

- .1 Ensure that surfaces to receive adhesive or insulation are dry, firm, straight, and free from loose material, projections, ice, frost, slick, grease, oil or other matter detrimental to bond of the adhesive or uniform bedding of the insulation.
- .2 Maintain surface and ambient temperatures during application and curing of adhesive at a temperature recommended by the manufacturer of the type of adhesive used.

3.2 Installation - General

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces as indicated on Drawings.
- .2 Fit insulation tight to electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other projections or openings.
- .3 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation panels free from ripped backs or chipped or broken edges.
- .4 Install materials in accordance with Manufacturer's instructions.
- .5 Do not cover insulation until it has been reviewed by Contractor Administrator.

3.3 Installation - Insulation

- .1 Apply adhesives to substrate at rate recommended by Manufacturer.
- .2 Fix insulation clip type fasteners on substrate, 2 per 600 x 1200 mm (24" x 48") board minimum. Impale insulation board on insulation clips, butting all joints firmly together and secure with washers, cut off spindles 3 mm ($\frac{1}{8}$ ") beyond washer.
- .3 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm (6") wide 6 mil polyethylene strip over joint using compatible adhesive prior to application of insulation.
- .4 Supply and install flexible insulation of equivalent thickness and thermal insulation to fit areas where application of rigid insulation is not possible to provide continuous coverage.
- .5 Perimeter Insulation: Install insulation boards on exterior face of perimeter foundation walls. Apply with adhesive or cement mortar mix.

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- .1 Protect entire face of insulation exposed to back-fill with light weight cement boards.
- .6 Concrete Slab Insulation: Lay insulation boards where shown.
 - .1 Under Slab Application: Ensure fill is level and properly compacted prior to placing insulation.
- .7 Installation - Batt or Roll Insulation
 - .1 Fit batt between framing and press firmly into place. Butt tightly at joints, free of gaps.
 - .2 Insulate behind pipes, ducts, electric conduits and outlets or junction boxes. Cut insulation to fit around and behind obstructions and non-standard spaces.

3.4 Installation - Lightweight Cement Board

- .1 Fasten cement boards to support structure with appropriate screws at every 200 mm (8"), and at a minimum edge distance of 10 mm ($\frac{3}{8}$ "). Drive screws so that screw heads are flush with board surface without damaging the fibreglass mesh facing. Ensure that the boards are well attached and that they are in continuous contact with the support.
- .2 Install 50 x 50 mm (2" x 2") 20 gauge galvanised steel corner casing bead at interior and exterior corners, using concealed fasteners.
- .3 Do not attach other work directly to cement boards.
- .4 Do not impede drainage of the system. Do not create water back-ups.

END OF SECTION

AIR BARRIERS

1. GENERAL

1.1 Quality Assurance

- .1 Installers: Skilled mechanics having minimum five (5) years experience in the Work specified and having an understanding of the design principles of air barrier.
- .2 Installation: Maintain continuity of air barrier at interface with adjacent construction and at where work of other Sections project through the air barriers. Allow for expansion and contraction and linear movement of these items.
- .3 Pre-installation meeting: Before commencing the work of this Section, arrange a Site meeting attended by the Contractor, the Contract Administrator, and the material Manufacturers' qualified representative. Discuss surface conditions, application procedures, suitability of materials and alternative recommendations.

1.2 Submittals

- .1 Samples: Two 150 x 150 mm (6" x 6") samples of sheet air barriers.

1.3 Delivery, Storage, and Handling

- .1 Deliver materials in factory wrapped rolls with labels indicating manufacturer and trade name, material type, thickness, roll width and area.
- .2 Protect materials from direct exposure to sunlight and physical damage.

1.4 Coordination

- .1 Coordinate installation of sheet air-vapour barrier with work of other Sections to achieve an air and vapour tight building envelope.

2. PRODUCTS

2.1 Materials

- .1 Air/Vapour Barrier Membrane: 1 mm (40 mils) thick modified bituminous composite sheet, Perm-A-Barrier by W.R. Grace Co. of Canada Ltd., Blueskin SA by Bakor Inc., Air-Shield by WR Meadows, or Sopraseal Stick 1100 by Soprema, complete with primer, mastic and liquid membrane as required.

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3. EXECUTION

3.1 Installation - Air Barrier Membrane

- .1 Install the membrane in strict accordance with the Manufacturer's written instructions and the representative's on Site instructions.
- .2 Ensure complete coverage of and adhesion to all substrate to receive the air/vapour barrier membrane, including all wall protrusions. Extend membrane 150 mm (6") below sill plates at foundation walls. Co-operate with other Sections to ensure continuity of the barrier.
- .3 Apply the membrane to primed substrate in 2400 mm (8') lengths or as recommended by the membrane Manufacturer.
- .4 Apply membrane so that horizontal joints overlap with the upper sheet over the lower sheet, shingle style. Lap all horizontal joints minimum 50 mm (2") all side joints minimum 64 mm (2¹/₂") and all end joints minimum 150 mm (6"). Stagger vertical joints to avoid four way joints.
- .5 Apply a trowelled head of mastic to all terminations of the membrane at the end of a day's work and at membrane terminations.
- .6 Reinforce all inside and outside corners with a continuous 300 mm (12") wide sheet membrane prior to installing the air/vapour barrier.
- .7 Fill gaps and joints with liquid membrane and reinforce with a continuous 300 mm (12") wide sheet membrane prior to installing the air/vapour barrier.
- .8 Use liquid membrane at all protrusions and difficult detail areas and provide a minimum 64 mm (2¹/₂") overlap with the sheet membrane.
- .9 Apply air/vapour barrier so that the exterior wall is air tight, with air tight junctures at openings, penetrations, and edges.
- .10 Inspect air/vapour barrier for continuity immediately prior to installation of insulation. Do not cover the air/vapour barrier until it has been inspected.
- .11 Repair punctures, rips and tears with pieces of membrane completely adhered to the damaged membrane.
- .12 Where punctures and tears are extensive, replace entire damaged section.
- .13 Install membrane over doors, windows, and other openings to exterior walls.
- .14 At openings, extend membrane 200 mm (8") beyond jambs, heads and sills.
- .15 Use mastic or fixing bars to adhere membrane to windows, doors etc. to maintain continuity of the barrier.

AIR BARRIERS

3.2 Inspection

- .1 Do not cover any portion of the air-vapour barrier until it has been inspected by the Contract Administrator or by an inspection agency appointed by the Contract Administrator.

END OF SECTION

METAL CLADDING

1. GENERAL

1.1 Performance Requirements

- .1 Expansion and Contraction: Design work to accommodate expansion and contraction within design temperature range.
- .2 Design Wind and Temperatures: In accordance with requirements of the governing building code.
- .3 Deflection: Maximum L/240 of clear span at design loads.
- .4 Design work to maintain profile specified.

1.2 Quality Assurance

- .1 Installer: Trained and approved by the manufacturer and having a minimum five (5) years experience in the installation of the work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type. If requested, provide a letter of certification from the Manufacturer stating that the installer is a certified applicator of its products, and is familiar with proper procedures and installation requirements required by the Manufacturer.
- .2 Maintenance Seminars: Provide, to the City, training seminars and recommendations on product maintenance procedures.
- .3 Pre-Installation Meeting: Two (2) weeks prior to commencing work of this Section, arrange for Manufacturer's Technical Representative to visit the Site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the work of this Section. Advise the Contract Administrator of the date and time of the meeting.
- .4 Manufacturer's Site Inspection: Have the Manufacturer's Technical Representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the work is correctly installed. When requested, submit Manufacturer's inspection reports and verification that the work of this Section is correctly installed.
- .5 Source Limitations: Obtain each type of product from a single manufacturer.

1.3 Submittals

- .1 Samples: Duplicate 50 x 75 mm (2" x 3") samples of each type of cladding material, in colour and profile specified.
- .2 Shop Drawings: Clearly indicate type of metal cladding being supplied, surface finish, type and thickness of insulation, thicknesses of metal cladding components, size, spacing and location of structural supports, Z bars and sub-girts, connections, types and locations of

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fastenings. Indicate provisions for structural and thermal movement between metal cladding and adjacent materials.

2. PRODUCTS

2.1 Materials

- .1 Roll Formed Metal Cladding Panel: Sheet steel coil coated to ASTM A755, galvanized by the hot dip process to ASTM A653M, Z275. Prefinish sheet to meet or exceed requirements of Baycoat Metallic Series, colour to match UC51131XL Bright Silver Metallic by PPG, apply colour on top side only.
- .2 Aluminium Plate Cladding Panels: Prefinished, plate aluminium alloy 3105-H14 or 3003-H14, minimum 3.2 mm nominal thickness, reinforced, corners welded and ground smooth. Prefinish exposed to view aluminium surfaces in high performance fluoropolymer metallic finish, colour to match UC50958XL Silver Gray Metallic by PPG.
 - .1 High performance fluoropolymer finish: AA-C12C40R1x, chemical finish: cleaned with inhibited chemicals; chemical finish: conversion coatings; organic coating: Manufacturer's standard three coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70% polyvinylidene fluoride resin by weight. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
- .3 Metal Liner: L800 by Vic-West, of suitable core thickness hot dipped galvanized steel.
- .4 Flashings, Trims and Closures: Steel core thickness and finish to match siding. Inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material and colour as cladding, with fastener holes pre-punched.
- .5 Girts, Z members, Clips and Brackets: CAN/CSA G40.21, Grade 300W of required core steel thickness to meet design requirements, hot dipped galvanized after fabrication to CSA G164, thermally broken girts and Z members.
- .6 Fasteners: Non-corrosive concealed fasteners of stainless steel, aluminium or cadmium plated steel, as recommended by the manufacturer. Where exposed fasteners are required, provide fasteners in colours matching cladding work.
- .7 Sealant: CAN/CGSB-19.24, Dymeric by Tremco Ltd. or approved equal.
- .8 Backer rod: Non-absorbent, non-gassing, closed cell polyolefin foam, over sized 25%.
- .9 Wall Insulation: CAN/ULC S701 Type 3, expanded, extruded polystyrene board insulation, minimum compressive strength of 170 kPa (25 psi) at 10% deformation or yield; square edges; unfaced, Styrofoam Cavitymate Ultra by Dow Chemical of Canada Ltd.

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- .10 Insulation Adhesive: Compatible with wall insulation and approved by insulation manufacturer.

2.2 Fabrication

- .1 Co-ordinate and verify at the Job Site dimensions affecting work of this Section. Ensure suitability of adjacent building components in relation to work of this Section.
- .2 Accurately fit joints and intersecting members to true planes, adequately and securely fastened and made completely water and weathertight. Component fastening devices shall be of adequate strength and concealed, except as specified otherwise.
- .3 Fabricate work to profiles and sizes indicated complete with rabbets, interlocks, flashings, cappings, trim, filler sections as required to interface with work of other Sections. Make provisions for thermal and structural movements.
- .4 Fabricate all devices required for erection and adequate anchorage and attachment required to be built into or attached to substrate and framing members for proper support.
- .5 Accurately cut and form flashing true and straight without waves or buckles. Make adequate provision for thermal movement and make joints watertight.
- .6 Reinforce work to meet specified requirements and prevent undue deflection. Provide concealed corrosion resistant fastening and continuous formed prefinished cleats.

3. EXECUTION

3.1 Installation - General

- .1 Install cold rolled structural girts and other members required to support work of this Section except as otherwise shown on Drawings.
- .2 Install work in accordance with Manufacturer's written instructions, plumb with intersecting parts joined together to provide tight, accurately fitted joints with adjoining surfaces in true planes. Attach components in manner not restricting thermal movement.

3.2 Installation

- .1 Lay a ribbon of sealant on the face of the support at top and bottom of wall panels and around perimeter of openings. Line up and adjust interior liner sheets, press tightly against sealant and seal all vertical joints to form an air/vapour seal between liner and structural supports.
- .2 Fasten Z members and girts through liner sheets to structural supports with self-tapping screws at 300 mm centres and to suit loading requirements.

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- .3 Install insulation on liner sheets with adhesive. Butt each board against adjacent boards, with joints staggered. Fit neatly with tight joints around obstructions, openings and corners. Fill voids behind flashings and trim with neatly cut blocks of insulation.
- .4 Fasten cladding to Z members and girts with concealed fasteners where possible and at spacings to suit loading requirements. Ensure complete nesting of exterior siding sheets on Z members and girts and sealed side lap joints.
- .5 Align units end-to-end to provide accurate fit with corresponding sections parallel and straight. Keep exposed fasteners to a minimum. Maintain minimum end overlap of 50 mm (2") and locate directly over supports.

3.3 Installation - Flashing, Closure, Trim, and Accessories

- .1 Cut and flash openings for louvres, doors, windows and the like. Supply and install all necessary closures, flashings, gutter, downspouts, drips and trims, sealed to stop direct weather penetration.
- .2 Install soffit and fascia cladding as indicated.

3.4 Sealing

- .1 Seal junctions with adjoining work with sealant. Apply and cure sealant in accordance with Manufacturer's instructions.
- .2 Use backer rod to maintain correct sealant width/depth ratio as recommended by the sealant Manufacturer.
- .3 Apply sealant in continuous beads, using gun with proper size nozzle and sufficient pressure to fill voids and joints solid.
- .4 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .5 Tool exposed surfaces to give slightly concave shape.

END OF SECTION

SBS MODIFIED BITUMINOUS ROOFING

1. GENERAL

1.1 System Description

- .1 Concrete Deck: 2 ply SBS modified bituminous sheet roofing work, including but not limited to following:
 - .1 Concrete deck.
 - .2 Vapour barrier.
 - .3 Roof insulation.
 - .4 Tapered insulation
 - .5 Insulation overlay.
 - .6 Base sheet membrane.
 - .7 Cap sheet membrane.
 - .8 Base and cap sheet flashings.
 - .9 Roof walkways.

1.2 Quality Assurance

- .1 Perform work using skilled and experienced roofing mechanics fully conversant with standards, methods and techniques required for installation of roofing system specified herein. Ensure roofer is qualified and approved by membrane manufacturer.
- .2 Conform to CRCA Specification Manual as amended to date of this Specification, as applicable, except where indicated or specified otherwise.
- .3 Pre-installation meeting: Two (2) weeks prior to commencing work of this Section, arrange for Manufacturer's technical representative to visit the Site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the work of this Section. Advise the Contract Administrator of the date and time of the meeting.
- .4 Manufacturer's Site inspection: Have the Manufacturer's technical representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the Work is correctly installed. When requested, submit Manufacturer's inspection reports and verification that the work of this Section is correctly installed.

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1.3 Submittals

- .1 Shop Drawings: Reviewed and signed by Manufacturer's technical representative, showing method of installation and layout of each layer, fastening and flashings at edges, flashing of protrusions and penetrations, connection to air barrier in wall, details of insulation, tapered insulation layouts and vapour barrier.
- .2 Maintenance Data: Provide necessary maintenance data and repair instructions, recommendations for periodic inspections, care and maintenance. Identify common causes of damage with instructions for temporary patching until permanent repair can be made.

1.4 Delivery, Storage, and Handling

- .1 Deliver and store materials in dry location, in original containers with Manufacturer's wrappers and seals intact.
- .2 Keep membrane materials dry, stored in rolls standing on end, selvage edge up, elevated from contact with moisture, at temperatures not less than 5°C or more than 49°C. Handle rolls with care to avoid crushing, puncturing or other damage. Ensure selvage edge is not damaged during handling and banding strips are removed before application of membrane. Do not use wet or damp membrane.
- .3 Do not expose insulation and sheathing to wet weather. Store and handle insulation to prevent broken edges and corners, punctures, indentations or other damage. Remove damaged insulation from Site.
- .4 Protect sheet metal materials from bending and scratching.
- .5 Store adhesive, sealants and primers between 15°C and 26°C, or restore to temperature ranges before use.
- .6 Store combustible materials away from heat and open flames.

1.5 Extended Warranty

- .1 Provide membrane Manufacturer's ten (10) year non-prorated material, labour, and workmanship warranty, commencing from date of Total Performance, covering defects and deficiencies and weather tightness of complete roof and flashing system.

2. PRODUCTS

2.1 Materials - Roof And Flashing

- .1 Roofing and Flashing Base Sheet Membrane: CGSB 37-GP-56M, Type 2, Class C, Grade 1 or 2, minimum 3.0 mm ($\frac{1}{8}$ ") thick, non-woven polyester reinforcement and thermofusible elastomeric asphalt, thermofusible plastic film top and bottom face, applied by torching only,

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Sopralene Flam 180 by Soprema Waterproofing Inc., ModifiedPlus NP180P/P by Bakor Inc., or Torchflex TP-180-FF-Base by IKO Industries Ltd.

- .2 Roofing and Flashing Cap Sheet Membrane: CGSB 37-GP-56M, Type 1, Class A, Grade 2, minimum 3.5 mm (0.138") thick, non-woven 250 g/m² polyester reinforcement and thermofusible elastomeric asphalt, coloured ceramic or mineral granules top face and thermofusible plastic film bottom face, applied by torching only, Sopralene Flam 250Gr by Soprema Waterproofing Inc., ModifiedPlus NP250gT4 by Bakor Inc., or Torchflex TP-250-Cap by IKO Industries Ltd. Standard colour ceramic or mineral granules.
- .3 Roof Walkways: CGSB 37-GP-56M, Type 1, Class A, Grade 2, be minimum 3.5 mm (0.138") thick, non-woven 250 g/m² polyester reinforcement and thermofusible elastomeric asphalt, coloured ceramic or mineral granules top face and thermofusible plastic film bottom face, and be applied by torching only, Sopralene Flam 250Gr by Soprema Waterproofing Inc., or ModifiedPlus NP250gT4 by Bakor Inc., or Torchflex TP-250-Cap by IKO Industries Ltd. Standard colour ceramic or mineral granules.

2.2 Materials - Insulation

- .1 Roof Insulation: CAN/ULC S-701 Type 3, expanded, extruded polystyrene board insulation, ship lapped edges, unfaced, Deckmate Plus by Dow Chemical Canada Inc.
- .2 Tapered Insulation: CAN/ULC S701, Type 2; CFC and HCFC free, unfaced expanded polystyrene insulation, maximum length and width, square edge, taper cut to provide slopes indicated, on computer controlled machine and sequence packed with detailed installation instruction, minimum 13 mm(¹/₂") thick.
- .3 Insulation Overlay: 6 mm (¹/₄") thick board, mineral filled asphalt core between glass fibre facers, Re-Cover Board by Bakor, Sopraboard by Soprema or Protectoboard by IKO.
- .4 Insulation adhesive: As recommended by insulation manufacturer.

2.3 Materials – Metal Flashing

- .1 Sheet Metal: Minimum 0.49 mm (26 ga) overall thickness, galvanized to ASTM A653 Z275 zinc coating, commercial quality sheet, stretcher levelled or temper rolled to stretcher level standard of flatness. Prepaint work in Baycoat Metallic series, colour to match UC52061XL Concord Blue Metallic by PPG.
- .2 Aluminium Flashing And Trim Sheet Metal: Prefinished aluminium, 0.8 mm base metal thickness, colour to match UC52061XL Concord Blue Metallic by PPG.
- .3 Cleats and Starter Strips: Same as specified sheet metal, unless indicated otherwise, make cleats at least 38 mm (1¹/₂") wide and interlocked with metal flashing.
- .4 Flashing Fasteners: CSA B111 Table 12, finished to match metal being fastened where exposed to view. Size and type to suit requirements.

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- .5 Sealant: CAN/CGSB-19.13-M, Class M-2-25-B-N, one component polyurethane, or Manufacturer's approved products.

2.4 Materials - Accessories

- .1 Asphalt primer: CGSB 37-GP-9Ma or as approved by Manufacturer.
- .2 Asphalt: CSA A123.4-M; Type 2 or Type 3.
- .3 Vapour Retarder: CSA A123.3-M, No. 15 perforated, organic type felt.
- .4 Joint Reinforcement: 0.8 mm (0.031") thick, self-adhering, SBS modified bitumen membrane with a high density cross laminated polyethylene film, VaporBloc SA by Bakor or Soprapap'r by Soprema. Complete with primer, liquid member and mastic.
- .5 Precast Pavers: CSA A231.2, precast concrete pavers, smooth faced 600 x 600 x 45 mm (24" x 24" x 1³/₄") thick of steam cured 30 MPa concrete with between 4% and 6% entrained air, with edges chamfered.
- .6 Pedestals: Black plastic mouldings, complete with spacers, sized to suit pavers.

3. EXECUTION

3.1 Inspection

- .1 Report any defects or irregularities in roof deck detrimental to roof application. Do not proceed until corrected.
- .2 Allow concrete deck to cure for minimum thirty (30) calendar days before placement of any roofing materials.
- .3 Check deck is properly installed in compliance with latest CRCA recommendations and Specifications, with required slopes to attain positive drainage and drains are connected.
- .4 Ensure openings, walls and projections through deck are completed and affixed and reglets and nailing strips are in place prior to membrane installation. Cooperate with mechanical and/or electrical divisions as necessary.
- .5 Ensure deck substrate scheduled to receive roof system is smooth, dry, clean and free of sharp projections.

3.2 Preparation

- .1 Apply 300 mm strips of continuous joint reinforcements, centred over joints of precast concrete slabs.

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- .2 Sweep roof surfaces clean, remove debris, water, dew, frost, snow, ice and foreign materials (oil/grease) which could impair work.
- .3 Do not use salt or calcium to remove ice or snow.
- .4 Do no roofing work during rain, fog, sleet or snow, or upon surfaces covered with dust, water, dew, ice, frost, snow, and similar detrimental conditions.

3.3 Protection

- .1 Protect adjacent work, building and property, existing and completed portion of roof, from damage during roofing operations.
- .2 Hang tarpaulins to protect walls where hoisting is necessary. Locate kettles so smoke will not discolour building or adjacent buildings or enter air intakes. Keep masonry and finished surfaces clean and free of bitumen.
- .3 Use wood planks or minimum 9 mm ($\frac{3}{8}$ ") thick plywood sheathing in work areas and along work routes as required to prevent damage to steel deck, or sheathing and roofing.
- .4 Keep two (2) foam or dry type fire extinguishers on roof within easy access of torching application and in any open flame location while roofing is in progress.
- .5 Verify no vent pipes venting flammable fumes (i.e. fuel storage tanks) are located in area of work.
- .6 Do not have gasoline or other flammable solvents on roof while torching.
- .7 Install temporary blocking and/or otherwise protect drains during roofing operations. Remove at completion of roofing work.
- .8 At conclusion of each day's work, seal exposed edges of roof insulation. Remove when resuming work.
- .9 Do not torch over or near flammable substrates such as fibreboard.

3.4 Cold Weather Application

- .1 Remove moisture from substrate before application of membrane.
- .2 Daily weather forecasts shall be followed to determine commencement of work or to anticipate possible suspension.
- .3 At temperatures below 10°C, store membrane material in warm and dry storage until ready to use. Bring out to work area only enough rolls for immediate use.
- .4 Unroll membrane and allow roll to relax in sunlight for 30 to 45 minutes before application. Reroll from both ends and apply in both directions.

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- .5 Maintain mopping temperatures of asphalt at minimum 204°C. Limit mop strokes to 1200 mm (48") ahead of roll.
- .6 Before starting mop stroke, pull roll tightly against cooled asphalt, so as to eliminate any air pockets or voids that may have occurred during previous mop stroke.

3.5 Installation

- .1 General: Use only roofing equipment approved by Manufacturer of roofing membrane system.

3.6 Installation - Primer

- .1 Prime concrete deck with asphalt primer in manner approved by primer manufacturer, at minimum rate of 0.50 l/ m² (1 gal/300 ft²).
- .2 Apply primer to surfaces to which membrane or vapour barrier shall be adhered to directly. Allow primer to cure. Do not allow ponding.

3.7 Bitumen

- .1 Heat asphalt in accordance with manufacturer's directions. Never heat asphalt to or above Flash Point (FP) indicated by manufacturer, but in any case do not heat asphalt to or above 260°C.
- .2 Do not apply at temperature lower than EVT (Equiviscous Temperature). Restrain asphalt temperature at point of application to EVT plus/minus 15°C.
- .3 Do not heat and hold asphalt above Finish Blowing Temperature (FBT) for more than four (4) hours.
- .4 Use heating kettles equipped with thermometers which continually show temperature of asphalt. Equip foreman with portable stem thermometer for checking temperature at point of application.
- .5 Roofing Asphalt: Type 2 for slopes up to 1:16 and Type 3 for slopes greater than 1:16.

3.8 Vapour Retarder

- .1 General: Install vapour retarder full coverage and continuously, overlapped and sealed to adjacent air/vapour barrier at top of parapets and curbs to ensure continuity of building envelope.
- .2 Mop prime deck with uniform and continuous coating of asphalt. Roll felt in hot mopped asphalt, lapping each sheet 480 mm (19") over preceding sheet and mopping full 480 mm (19") under each lap leaving no area unmopped. Use 1.2 kg/m² (25 lb/sq) of asphalt per ply. Seal lap joints.

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3.9 Installation - Insulation

- .1 Before laying any insulation, inspect vapour barrier and repair damage, if any. Ensure surface is free of wrinkles, air pockets, fishmouths or tears.
- .2 Over vapour barrier apply full mopping of asphalt at minimum rate of 1.0 kg/ m² (20 lb/sq) and embed insulation.
- .3 Lay roof insulation in hot asphalt. Bring each board into moderate contact with adjacent boards and do not force into place.
- .4 Cover entire area of base insulation with tapered insulation. Lay in accordance with Manufacturer of tapered insulation's Shop Drawings, with joints staggered from insulation joints. Lay each layer in full mopping of hot asphalt. Tape joints in top layer of insulation.
- .5 Cover entire area of tapered insulation with overlayment. Stagger joints of lower overlayment to those of tapered insulation. Stagger joints upper overlayment to those of lower overlayment. Lay work in full mopping of asphalt.
- .6 Where insulation and overlayment abut irregular surface, scribe to profile thereof, elsewhere cut insulation square and neatly to provide plain butt joints at perimeter of insulation, at curbs and other vertical objects and surfaces.
- .7 Lay only as much roof insulation and overlayment that can be covered on same day with roofing membrane. At conclusion of day's work, seal exposed edges. Upon resumption of work, cut and remove sealed edges, square, neat and straight.
- .8 Reduce thickness of insulation at drains by 13 mm (¹/₂") for 1200 mm (48") square centred on each drain to ensure free flow to drain.
- .9 Keep insulation, tapered insulation and insulation overlay dry at all times.

3.10 Base Sheet Membrane

- .1 Ensure membrane substrate is rigid, dry, smooth, compatible, free of fins and sharp edges, and clean of debris and foreign matter and no moisture is present on substrate at time of application of membrane.
- .2 Start roofing application at lowest point of roof (edge or drain) to ensure water flows over laps of membrane. Proceed up slope at right angles to direction of flow.
- .3 Position and unroll membrane to achieve correct overlap and alignment with roof line. Re-roll one end minimum 3000 mm (10') and adhere to substrate. Complete application of remainder of sheet.
- .4 Torch weld base sheet membrane by sufficiently heating lower surface of membrane evenly across width of roll to melt lower surface and provide flow of bitumen. At same time unroll

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roofing membrane into melted bitumen. Keep checking adhesion to be certain asphalt is hot enough. Take care and inspect so heating is even across width to avoid skips or voids.

- .5 Lay base sheet with 75 mm (3") side laps and 150 mm (6") end laps.
- .6 Flow out bead shall be present at all locations along lap edges. Avoid excessive asphalt seepage. Maximum seepage allowed 6 mm ($\frac{1}{4}$ ").
- .7 At walls and vertical surfaces, extend membrane minimum 50 mm (2") on vertical surface and nailed at 300 mm (12") on centres.

3.11 Base Sheet Flashings

- .1 Apply base sheet flashing over dried and cured primer coat.
- .2 Pre-cut flashing in strips 1 m (39") wide to correct length to extend minimum 100 mm (4") onto field of roof, up vertical surface and over any fascia minimum 50 mm (2"). Side laps shall be 75 mm (3") and staggered minimum of 100 mm (4") with laps of base sheet. Dry fit pieces to proper size.
- .3 Provide base flashing reinforcements at stress points of roof, at inside and outside corners, vents, drains and mechanical units. Install as detailed on Drawings or follow membrane Manufacturer's recommendations.
- .4 Provide base flashings at roof protrusions such as vents pipes, roof drains, mechanical equipment curbs. Install as detailed on Drawings.
- .5 Torch apply base sheet flashing directly on its support from bottom to top. Torch welding shall soften under side of base sheet without overheating, resulting in uniform adhesion over entire surface. Take precaution not to stretch membrane. When allowed by support, nail top edge of base sheet flashing 300 mm (12") oc.

3.12 Cap Sheet Membrane

- .1 Do not apply cap sheet until base sheet and flashing have been applied and show no sign of defects.
- .2 Plan cap sheet application so side and end laps are offset from those of base sheet minimum 300 mm (12") for side and 450 mm (18") for end laps. Mark chalk line, centred on base sheets, where first course is to start. Unroll 2 to 3 m (6' to 9') of membrane and line it up to chalk lines or to selvage edge. If roll goes out of line by more than 13 mm ($\frac{1}{2}$ "), cut and re-align. Re-roll from both ends and apply in both directions.
- .3 Lay cap sheet with 75 mm (3") side laps to cover selvage edge and 150 mm (6") end laps.
- .4 Commence application of cap sheet with 1 m² (39") of cap sheet centred on each drain and torched down.

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- .5 Apply 1 ply of cap sheet granule side up. Position and unroll cap sheet to achieve correct overlap and alignment. Re-roll one end minimum 3000 mm (10') and adhere to substrate. Complete application of remainder of sheet. Torch weld by sufficiently heating lower surface of membrane evenly across width of roll to melt lower surface and provide flow of bitumen. At same time unroll roofing membrane into melted bitumen. Keep checking adhesion to be certain asphalt is hot enough. Take care and inspect so heating is even across width to avoid skips or voids. Install cap sheet in same direction as base sheet.
- .6 Flow out bead shall be present at all locations along lap edges. Avoid excessive asphalt seepage. Maximum seepage allowed 6 mm ($\frac{1}{4}$ ").
- .7 Take great care to ensure asphalt does not spread out over exposed part of cap sheet.
- .8 Factory provided granules shall be applied to overflow bitumen at lap before bitumen cools to provide clean appearance.
- .9 Bevel "T" joints at end or head laps and repair fishmouths using torch heated trowel.
- .10 Cut out drain opening after drain clamps have been installed.

3.13 Cap Sheet Flashings

- .1 Pre-cut flashing in strips 1 m (39") wide to correct length to extend minimum 150 mm (6") onto field of roof, up vertical surface and over any fascia minimum 50 mm (2"). Side laps shall be 75 mm (3") and staggered minimum of 100 mm (4") with laps of base sheet. Dry fit pieces to proper size.
- .2 Using chalk line, lay out straight line on cap sheet surface, parallel to roof edge, 150 mm (6") inside roof from parapet wall.
- .3 Soften bitumen by heating mineral surface with torch. When granules start to sink into bitumen, stop torching with hot round nosed trowel, embed granules in bitumen from chalk line to edge of cap sheet.
- .4 Torch apply cap sheet completely covering base sheet, lapping edges to selvage. Torch welding shall soften under side of base sheet without overheating, resulting in uniform adhesion over entire surface. Press in firmly for proper adhesion. Continue by bonding upper portion to wall, taking precautions not to stretch membrane.
- .5 Anchor, with tin capped nails or roofing nails and disks or membrane manufacturer's recommended fasteners placed at top of flashing and driven into wood backing.
- .6 Flow out bead shall be present at all locations along lap edges. Avoid excessive asphalt seepage. Maximum seepage allowed 6 mm ($\frac{1}{4}$ ").
- .7 Take great care to ensure asphalt does not spread out over exposed part of cap sheet flashing.

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- .8 Factory provided granules shall be applied to overflow bitumen at lap before bitumen cools to provide clean appearance.

3.14 Sheet Metal Work

- .1 Do not install metal flashings until membrane flashings have been reviewed by Contract Administrator.
- .2 Prime metal flashings with asphalt primer.
- .3 Double back exposed edges at least 13 mm ($\frac{1}{2}$ ") for appearance and stiffness.
- .4 Provide continuous starter strips to present true, leading edge. Anchor to backup to provide rigid, secure installation. Conceal fastening.
- .5 Counterflash modified bitumen flashings as indicated. Dovetail, mitre corners.
- .6 Use slip expansion seams. Make joints to permit thermal movement. Make surfaces free from buckling, warp, wave, dents, oil canning or other defects. Make corners square and surfaces straight and in true planes. Equally space joints in any one run of flashing to suit building module or window spacing and in all cases locate in consultation with Contract Administrator before installation commences. Space seams 2400 mm (8') oc maximum or closer if indicated.
- .7 Obtain Contract Administrator's acceptance of exposed fastenings. If exposed screws or bolts are used, use lead or neoprene washers with them.
- .8 Close lock seams gently with wood block and mallet, apply sealant to joints.

3.15 Roof Walkways

- .1 Remove loosely embedded granules from cap sheet in areas to receive walkways. Prime cap sheet area to which roof walkways will be applied.
- .2 Apply walkways in 900 x 900 mm (36" x 36") sections spaced 25 mm (1") apart to prevent ponding of water. Ensure walkways do not hinder drainage patterns of roofing system.
- .3 Torch apply walkways membrane to roof cap sheet. Sufficient heat should be applied to melt lower surface of roof walkways membrane and provide flow of bitumen. At same time unroll membrane into melted bitumen. Ensure flow out bead is present at all locations along lap edges. Maximum seepage allowed 6 mm ($\frac{1}{4}$ ").
- .4 At roof perimeters and/or where indicated on Drawings, place precast concrete pavers spaced 13 mm ($\frac{1}{2}$ ") apart on pedestals. Shim pavers level using pedestal Manufacturer's shimming system.

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3.16 Expansion Joints

- .1 Expansion Joints: Construct expansion joints within roof construction in locations indicated on Drawings.

3.17 Field Quality Control

- .1 Inspection: City may engage independent inspection company to inspect work of this Section. Give at least fourteen (14) calendar days' notice of starting work and allow inspector free access. Inspection may include thermographic survey of completed roof.

END OF SECTION

ROOF HATCHES

1. GENERAL

1.1 Design Requirements

- .1 Roof hatches to withstand snow load, wind uplift and temperature range as required by building code without damage to unit or permanent deformation to seals, and without damage to roofing.

1.2 Shop Drawings

- .1 Shop Drawings: Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.
- .2 Maintenance Data: Complete with pertinent details, spare parts lists and warnings against harmful maintenance materials and practices.

2. PRODUCTS

2.1 Manufacturer

- .1 Specified Products: Work of this Section is based on specified products. Products by other manufacturers similar in function, design, performance, and construction complying with requirements of this Section may be incorporated into the Work subject to Contract Administrator's acceptance.

2.2 Materials

- .1 Sheet Aluminium: Mill finish plain utility sheet.
- .2 Extruded Aluminium: AA6063-T5 alloy, all components one piece without splices.
- .3 Gaskets: Extruded resilient neoprene, with full recovery after 50% compression.
- .4 Fasteners: Screws to manufacturers standard, stainless steel.
- .5 Sealants: Multi component, Dymeric by Tremco.
- .6 Isolation Coating: Alkali resistant bituminous paint or epoxy solution.

2.3 Roof Hatches

- .1 Insulated, weathertight, capable of supporting a minimum live load of 195 kg/sq.m. (40 psf) with maximum deflection of L/150 and resist an 100 kg/m² (20 psf) wind uplift. Cover operation smooth and controlled and unaffected by change in temperature range expected at the Place of the Work.
 - .1 Ladder Access Hatch: Single leaf, Type S by Bilco, or R-100 by Lexcor.

ROOF HATCHES

- .2 Equipment Access Hatch: Single leaf, aluminium, Type D by Bilco.
- .2 Cover: 11 gauge mill finish aluminium, reinforced, insulated, extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
 - .1 Cover Insulation: 25 mm thick mineral fibre, fully covered and protected by metal liner 18 gauge mill finish aluminium.
 - .2 Reinforcing: Bolt cover hardware into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
 - .3 Hinges: Heavy duty pintle hinges
 - .4 Latch: Two point spring latch with interior and exterior turn handles. Latch strike bolted to curb assembly.
 - .5 Padlock Hasps: Interior and exterior padlock hasps.
 - .6 Hold Open Arm: Equip cover with an hold open arm which automatically locks the cover in the open position.
- .3 Curb: 300 mm high of same material as cover, and insulated with mineral fibre insulation. Form curb with a 90 mm ($3\frac{1}{2}$ "") flange with 11 mm ($\frac{7}{16}$ "") holes for securing to the roof deck. Equip curb with integral fully welded metal cap flashing of the same gauge and material to roofing membrane securely in place.
- .4 Lifting Mechanisms: Compression spring operators enclosed in corrosion resistant composite telescopic tubes controlling cover operation throughout the entire arc of cover upward motion and acting as a check in retarding cover downward motion when closing. Interlock lower tube with a flanged support shoe securely welded or through bolted to curb assembly.
 - .1 Springs: Electrocoated acrylic corrosion resistant finish.

2.4 Accessories

- .1 Safety Post: Telescoping tubular hot dip galvanized post, self locking when fully extended, up and down movement controlled by stainless steel spring balance, designed for installation to fixed ladders below hatch covers, complete with mounting fasteners, LU-2 LadderUP by The Bilco Company.

2.5 Fabrication

- .1 Fabricate components free of twists, bends, or visual distortion and insulated. Weld corners and joints.
- .2 Ensure continuity of weather-tight seal.

ROOF HATCHES

- .3 Design flashings to collect and lead off accumulated condensation.
- .4 Zinc plate hardware and attachments and shop prime ready for field painting.

3. EXECUTION

3.1 Installation

- .1 Erect hatches and accessories plumb, level and in proper alignment.
- .2 Ensure water-tightness continuity of roofing systems.
- .3 Adjust and seal assembly with provision for expansion and contraction of components.
- .4 Secure curb assembly to structure.
- .5 Coat metals contact with dissimilar materials, with isolation coating.
- .6 Secure and seal frame to curb.

END OF SECTION

FIRESTOPPING AND SMOKE SEALS

1. GENERAL

1.1 Quality Assurance

- .1 Firestopping and smoke sealing shall be by competent installers having minimum five (5) years experience in application of materials and systems being used, approved and trained by material or system manufacturer.
- .2 Asbestos free firestopping and smoke seal materials and/or systems to provide closures to fire and smoke at openings around penetrations, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions. System shall provide draft tight barriers to retard passage of flame and smoke, and firefighter's hose stream and passage of liquids. System shall provide and maintain fire resistance rating of adjacent floor, wall or other fire separation assembly acceptable to authorities having jurisdiction. Provide firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside bus ducts) respectively and around outside of such mechanical and electrical assemblies where they penetrate rated fire separations.
- .3 Firestopping and smoke seal materials shall conform to both the temperature and flame ratings of ULC-S115 and, where applicable, to ASTM E814, and other requirements of authorities having jurisdiction.

1.2 Submittals

- .1 Submit Shop Drawings indicating ULC assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, installation methods and materials of firestopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, size of opening, adjacent materials and number of penetrations. Submit copies of current ULC listings for each system and certified copies of test reports verifying that firestopping and smoke seals meet or exceed specified requirements.

1.3 Environmental Requirements

- .1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and material safety data sheets acceptable to Ministry of Labour.

2. PRODUCTS

2.1 Materials

- .1 Certified and listed by ULC or WH in accordance with CAN4-S115 and bearing ULC or WH label, products shall be heat resistant, flexible, durable and compatible with adjacent materials and finishes. System shall be self supporting at penetration capable to adhere and yet maintain its integrity while providing effective barrier against passage of flame, smoke and gases. Product shall provide flame and temperature rating in accordance with

FIRESTOPPING AND SMOKE SEALS

requirements of OBC for openings in respective fire resistance rated floor, wall or other assembly.

- .2 Firestop Systems: Certified by ULC, WH and listed in ULC Guide No. 40 U19.
- .3 Firestop System Components: Certified by ULC, WH and listed in ULC Guide No. 40 U19.13 under the Label Service of ULC.
- .4 Cementitious Matrices: Minimum 2758 kPa (400 psi) compressive strength when cured, to retard cable tray warping within the firestop seal.
- .5 Firestopping and Smoke Seals at Openings Where Reinstallation Occurs: An elastomeric or re-useable cementitious matrix or putty seal; do not use a permanent cementitious seal at such locations.
 - .1 Firestopping and smoke seals at openings around penetrations for electrical bus ducts, pipes, ductwork and other electrical and mechanical items requiring sound and vibration control or allowance for expansion, contraction and other movement: An elastomeric seal; do not use a cementitious or rigid seal at such locations.
 - .2 Firestopping and smoke seals at joints and spaces designed and required to allow movement such as building movement joints, deflection spaces, control joints, expansion joints, and similar locations shall be flexible, elastomeric seal suitable to withstand the required movement and capable of returning to original configuration without damage to seal and without adhesive or cohesive failure; do not use a cementitious or rigid seal at such locations.
 - .3 Primers: To Manufacturer's recommendation for specific material, substrate, and end use.
 - .4 Water (if applicable): Potable, clean and free from injurious amounts of deleterious substances.
 - .5 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.
 - .6 Pipe and Duct Insulation and Wrappings: Compatible with firestopping systems.
 - .7 Intumescent Pads: Permanently pliable type.
 - .8 Intumescent Composite Sheet: Composite sheet, strip or precut shapes.
 - .9 Sealants and Putty For Vertical And Overhead Joints: Non-sagging.
 - .10 Sealants and fluid seals at floors: Self-levelling.

FIRESTOPPING AND SMOKE SEALS

- .11 Materials and products shall not cause stress, chemical or physical reaction, or other damage to penetrating items or adjacent materials.

3. EXECUTION

3.1 Installation

- .1 Ensure materials and products are compatible with abutting materials, coatings and finishes. Remove applied coatings and finishes as required to permit proper installation and adhesion.
- .2 Ensure that pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seal are installed prior to work of this Section and that insulation and wrapping within fire seals is a ULC listed component of the system to be installed, unless ULC certified assembly permits such other insulation and wrapping to remain within the assembly. Otherwise, precede installation of mechanical insulations or remove insulation from area of insulated pipe or duct where such pipes or ducts penetrate a fire separation. Coordinate work of this Section with the work of Division 15, Mechanical. Ensure the continuity and integrity of thermal and vapour barriers where such are removed, altered, or replaced, acceptable to Division 15 and the City.
- .3 Apply firestopping and smoke seals in accordance with Manufacturer's instructions and tested designs acceptable to authorities having jurisdiction to provide required temperature and flame rated seal, and to prevent passage of smoke and liquids.
- .4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing. Completely fill and seal voids with firestopping and smoke seal materials. Do not cover up materials until full curing has taken place. Notify when completed installations are ready for inspection and prior to concealing or enclosing firestopping and smoke seals.

3.2 Cleaning

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application. Remove temporary dams after initial set of firestopping and smoke seal materials.

END OF SECTION

JOINT SEALANTS

1. GENERAL

1.1 General Requirements

- .1 This Section specifies sealing Work not specified in other Sections. Refer to other Sections for the respective sealant work.

1.2 Submittals

- .1 Samples for Initial Selection: Provide 150 mm (6") long cured, colour samples of Manufacturer's standard range of colours in each type of sealant for selection by Contract Administrator. Submit samples of primer, bond breaker tape and joint backing material, if requested.
- .2 Product Data: Submit product information from sealant Manufacturers prior to commencement of work of this Section verifying:
 - .1 Selected sealant materials are from those specified.
 - .2 Composition and physical characteristics.
 - .3 Surface preparation requirements.
 - .4 Priming and application procedures.
 - .5 Suitability of sealants for purposes intended and joint design.
 - .6 Test report on adhesion, compatibility and staining effect on samples of materials used in the Work.
 - .7 Sealants compatibility with other materials and products with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumens, concrete, masonry, metals and metal finishes, paints.
 - .8 Suitability of sealants for temperature and humidity conditions at time of application.

1.3 Quality Assurance

- .1 Installer: Trained and approved by the Manufacturer and having a minimum three (3) years experience in the installation of the Work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type. If requested, provide letter of certification from Manufacturer stating that installer is certified applicator of its products, and is familiar with proper procedures and installation requirements required by the Manufacturer.
- .2 Maintenance Seminars: Provide, to the City, training seminars and recommendations on product maintenance procedures.

JOINT SEALANTS

- .3 Manufacturer's Site Inspection: Have the Manufacturer's Technical Representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the Work is correctly installed. When requested, submit Manufacturer's inspection reports and verification that the work of this Section is correctly installed.
- .4 Pre-Installation Meeting: Two (2) weeks prior to commencing Work of this Section, arrange for Manufacturer's Technical Representative to visit the Site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the Work of this Section. Advise the Contract Administrator of the date and time of the meeting.
 - .1 Weather conditions under which work will be done.
 - .2 Anticipated frequency and extent of joint movement.
 - .3 Joint design.
 - .4 Suitability of durometer hardness and other properties of material to be used.
 - .5 Recommendations of Manufacturer for mixing of multi-component sealants.
 - .6 Number of beads to be used in sealing operation and priming operation if required.

1.4 Delivery, Storage, and Handling

- .1 Deliver materials in original, unopened containers with Manufacturer's labels identifying Manufacturer's name, brand name of product, grade and type, application directions and shelf life or expiry date of product.
- .2 Handle and store materials in accordance with Manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.
- .3 Do not use sealing materials that has been stored beyond the maximum recommended shelf life.

1.5 Project Conditions

- .1 Environmental Requirements: Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5°C (40°F). Maintain minimum temperature of application during application and for eight (8) hours after application. Consult Manufacturer for specific instructions before proceeding and obtain Contract Administrator's approval.

1.6 Extended Warranty

- .1 Warrant Work of this Section against defects and deficiencies including cracking, crumbling, melting, shrinkage, sag, failure in adhesion, cohesion or reversion, air and moisture leakage,

JOINT SEALANTS

marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials.

2. PRODUCTS

2.1 MATERIALS

- .1 General: Non-bleeding, non-migrating, and capable of supporting their own weight.
 - .1 Horizontal Joints: Self levelling.
 - .2 Vertical and Overhead Joints: Non-sag.
- .2 Sealant Type A: CAN/CGSB-19.13-M, Class MCG-2-25-B-N, one component, chemical curing, urethane base, Sikaflex 1a by Sika, or Dymonic by Tremco.
- .3 Sealant Type B: CAN/CGSB-19.24-M, Type 2, Class B, multi-component, chemical curing, modified polyurethane, Sikaflex 2cNS EZ Mix by Sika, or Dymeric 240 by Tremco.
- .4 Sealant Type C: One component, chemical curing, mildew resistant silicone, DC786 by Dow Corning, Sanitary 1700 by GE Silicones, or Proglaze by Tremco.
- .5 Joint Backing: Preformed, compressible, resilient, non-waxing, non-extruding, non-staining closed cell polyethylene or urethane foam, shape to suit intended use, oversize 25% and compatible with sealant, primer and substrate.
- .6 Bond Breaker Tape: As recommended by sealant Manufacturer.
- .7 Joint Primer: Non-staining, suitable for substrate surfaces, compatible with joint sealants and as recommended by sealant Manufacturer.
- .8 Cleaning Material: Non-corrosive, non-staining, xylol, methyl-ethyl-ketone, toluol, isopropyl alcohol or as recommended by sealant Manufacturer and acceptable to material or finish Manufacturers for surfaces adjacent to sealed areas.
- .9 Sealants, Cleaning Materials and Primers: Compatible with each other.

3. EXECUTION

3.1 Examination

- .1 Ensure joints are suitable to accept and receive sealants. Commencement of Work implies acceptance of surfaces and conditions.
- .2 Do not apply sealant to masonry until mortar has cured.

JOINT SEALANTS

- .3 Before any sealing work is commenced, test materials for indications of staining or poor adhesion.

3.2 Preparation

- .1 Remove existing sealant from joints to be re-sealed. Ensure that all joint interfaces are clean and prepared to accept new work.
- .2 Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers, and other foreign material.
- .3 Clean porous surfaces such as concrete, masonry or stone by wire brushing, grinding, or sandblasting as required to obtain clean and sound surfaces.
 - .1 Remove laitance by grinding or mechanical abrading.
 - .2 Remove oils by abrasive blast cleaning.
 - .3 Remove loose particles present or resulting from grinding, abrading, or sandblast cleaning by thorough brushing.
- .4 Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.
- .5 Wipe non-porous surfaces such as metal and glass to be sealed, except pre-coated metals, with cellulose sponges or clean rags soaked with ethyl alcohol, ketone solvent, xylol or toluol and wipe dry with clean cloth.
 - .1 Where joints are to be sealed with silicone based sealants clean joint with methyl-ethyl-ketone or xylol. Do not allow solvent to air-dry without wiping.
 - .2 Clean pre-coated metals with solutions or compounds which will not injure finish and which are compatible with joint primer and sealant.
- .6 Install joint backing material to achieve correct and uniform joint profile.
- .7 Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape to prevent three-sided adhesion.
- .8 Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. Install bond breaker tape at back of joint where joint backing is not required or cannot be installed.
- .9 On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.

JOINT SEALANTS

- .10 Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.
- .11 Do not exceed shelf life and pot life of materials, and installation times, as stated by Manufacturers.
- .12 Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.
- .13 Use materials as received from Manufacturer, without additions, deletions, and adulterations of materials.
- .14 Mix multiple component sealants and bulk sealants using mechanical mixer capable of mixing without mixing air into material, strictly in accordance with Manufacturer's directions and recommendations. Continue mixing until material is homogeneously blended, uniform in colour and free from streaks of unmixed material. Install compound prior to start of hardening or curing cycle.
- .15 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are prime painted in shop before sealing check to make sure prime paint is compatible with primer and sealant. If they are incompatible, inform Contract Administrator and change primer and sealant to compatible types approved by Contract Administrator.
- .16 Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.
- .17 Prime joints as required by sealant Manufacturer. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker, or sealant.

3.3 Application

- .1 Apply sealant using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant Manufacturer. Apply in accordance with Manufacturer's directions and recommendations.
- .2 Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill all voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead shall not be acceptable.
- .3 Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.
- .4 Compound may be tooled, provided that such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.

JOINT SEALANTS

- .5 Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.
- .6 Joint surfaces shall be straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and be uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life products.

3.4 SEALANT SCHEDULE

- .1 Use one sealant specified for each type in following locations. Ensure sealant chosen for each location is recommended by Manufacturer for use for conditions encountered.
- .2 Refer to Drawings for sealing work not specifically listed in this Section.
- .3 Seal following joints with Sealant Type A:
 - .1 Interior non-rated masonry control joints.
 - .2 Interior top of non-rated masonry walls to structure above.
 - .3 Interior hollow metal door frames, both sides.
- .4 Seal following joints with Sealant Type B:
 - .1 Exterior hollow metal steel door frames, both sides.
 - .2 Joints between thresholds and slabs.
 - .3 Exterior control joints in masonry.
- .5 Seal following joints with Sealant Type C:
 - .1 Around pipes and conduits passing through walls and ceilings. Conceal sealant with escutcheons.
 - .2 Joints between access panels and walls.

3.5 Field Quality Control

- .1 As part of the work of this Section, conduct field inspection and testing by the Manufacturer's Technical Representative of a minimum 20% of sealant joints, including mixing of materials, joint preparation, priming, joint profile, application, adhesion, cohesion and tooling.
- .2 Submit written inspection reports to the Contract Administrator.

JOINT SEALANTS

3.6 Repair

- .1 Remove any compounds not complying with requirements specified herein. Exercise care in removal operations not to mar or damage finishes adjacent to joints. Repeat preparation, priming and installation of new material as specified to provide finished work complying with specified requirements and acceptable to Contract Administrator. Do such repair work at no extra cost to City.

3.7 Cleaning

- .1 Immediately clean adjacent surfaces which have been soiled and leave Work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use recommended cleaners and solvents.

3.8 Protection of Completed Work

- .1 Provide approved, non-staining means of protection for completed joint sealant installations where required to protect work from mechanical, thermal, chemical, and other damage by construction operations and traffic.
- .2 Maintain protection securely in place until completion of Work. Remove protection when so directed by Contract Administrator.

END OF SECTION