1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 00 10 - Construction/Demolition Waste Management and Disposal.

.3 Section 01 00 10 - Closeout Submittals.

1.02 REFERENCES

.1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.3 Underwriters' Laboratories of Canada (ULC).
- .1 CAN/ULC-S705.1-15, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification.
- .2 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

1.03 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.04 SITE CONDITIONS

.1 Protect adjacent surfaces and equipment from damage by fall-out and dusting of insulation materials.

.2 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

1.05 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.

2 PRODUCTS

2.01 MATERIALS

.1 Insulation: closed cell spray polyurethane to CAN/ULC-S705.1.

.1 Density: minimum 30 kg/m3 (ASTM D-1622)
.2 Water absorption: maximum 20% by volume (ASTM D-2842)
.3 Thermal resistance: minimum RSI 1.1 per 25mm after 180 days (ASTM C-518)
.4 Air leakage: system result maximum 0.005 l/s/m2 @ 75Pa

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions.

.2 Apply sprayed foam insulation in thickness to completely fill depth and width of complete perimeter voids.

3.03 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

.3 Section 01 00 10 – Closeout Submittals.

.4 Section 07 92 00 - Sealants

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A653/A653M-15e1, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A792/A792M-10(2015), Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .3 ASTM D523-14, Test Method for Specular Gloss.
- .4 ASTM D822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .5 ASTM D2832-92 (2016), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .6 ASTM E283-04 (2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- .7 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.2 Canadian Standards Association (CSA International)
- .1 CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
- .2 CSA S136.1-12, Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.

.3 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements
- .1 Design metal panel wall system in accordance with CSA S101 and S102.
- .2 Design metal panel wall to provide for thermal movement of component materials caused by ambient temperature differences for region of installation without causing buckling, failure of joint seals, undue stress on fasteners or other

detrimental effects.

.3 Design members to withstand dead load and wind loads calculated in accordance with NBCC 2005 and applicable local regulations, to maximum allowable deflection of 1/180th of span as tested in accordance with ASTM E72.

.4 Air resistance of assembly not to exceed 0.1 L/s/m^2 @ 75Pa in accordance with ASTM E283

.5 Control for water entering at joints in accordance with rain screen principles.

.6 No leakage permitted at 1.4KPa in accordance with ASTM E331

.7 Permeance through wall system not to exceed 5 ng/(Pa.s.m^2).

.8 Minimum RSI 4.2 value of system core.

.9 Design wall system to accommodate tolerances of the existing structure.

.10 Tolerances:

.1 Panel Bow: Maximum 0.8% of panel dimension per 1828mm panel length.

.2 Panel fabrication tolerances for length or width to be maximum of ± 1 mm and diagonal variation dimension not to exceed 3 mm

.3 Joints not vary more than 5% of dimensioned width at any location along full joint length and to not be wavy, out of line, or of different width from panel to panel

.4 Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm in 6 m non-accumulative

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:

.1 Indicate dimensions, wall openings, head, jamb, sill and mullion detail, materials and finish, anchor details, compliance with design criteria and requirements of related work.

.2 Ensure each shop drawing submitted has been stamped and sealed by licensed professional engineer licensed in Province of Ontario.

.4 Samples:

.1 Submit duplicate 200 x 200 mm samples of wall system, representative of materials, finishes and colours.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.6 Manufacturers' Field Reports: Submit copies of manufacturers field reports.

1.5 CLOSEOUT SUBMITTALS

.1 Provide closeout submittals in accordance with Section 01 78 00 – Closeout Submittals

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.7 EXTENDED WARRANTY

.1 For the work of this section 07 42 40, the 12 month warranty period is extended to 24 months.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Exterior sheet steel: minimum 22 gauge**,** roll-formed cladding chemically fused to core, structural quality, grade to ASTM A653:
- .1 Factory pre-coated with rust inhibitive primer and flouro-polymer finish coat.
- .2 Total dry film thickness: 1.6mil
- .3 Colour: to be selected by DCC Representative from manufacturer's complete selection. A total of 2 colours will be selected
- .4 Profile: micro-rib.

.2 Interior sheet steel: minimum 24 gauge**,** roll-formed liner sheet chemically fused to core, structural quality, grade to ASTM A653:
- .1 Factory precoated with silicone modified polyester finish.
- .2 Total dry film thickness: 1.0mil.
- .3 Colour: to be selected by DCC Representative from manufacturer's complete selection.
- .4 Profile: fluted

.3 For copings and flashings provide prefinished, formed material to match cladding, minimum thickness 1.6mm.

.4 Screws: cadmium plated steel, head colour same as exterior sheet, with neoprene washers.

.5 Sealants: in accordance with Section 07 92 00 - Sealants

.6 Tape: soft pliable butyl.

.7 Touch-up paint: as recommended by panel manufacturer.

2.2 COMPONENTS

.1 Exterior sheet: factory preformed coated metal, micro-rib profile, 915 mm wide sheets x longest practical length panels, double interlocking edges, each tongue to receive continuous bead of silicone sealant.

.2 Exterior corners: of same profile, material and finish as adjacent cladding material, factory built and brake formed to required angle, concealed corner brace, hairline exposed joint, pop rivet connections with painted head to match cladding.

.3 Exposed joint (perpendicular to profile): ends of cladding sheet shop cut clean and square,

backed with tight fitting filler lapping back of joint, exposed components colour matched to cladding.

.4 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, thickness and finish as exterior cladding, brake formed to shape.

.5 Interior liner sheet: factory formed, fluted profile.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Apply butyl tape to backside of all fastener locations to provide continuous air and moisture protection of all penetrations through panel system.

.2 Install cladding system to structural building supports, using self-tapping screws. Interlock and seal side and end joints. Pre-caulk each interlocking tongue joint to ensure continuous air and moisture barrier.

.3 Provide alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to building structure.

.4 Incorporate flashings, accessories and other components to complete installation.

3.3 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.3 Remove excess sealant with recommended solvent.

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

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 00 10 – Closeout Submittals

.3 Section 06 10 00 – Rough Carpentry

.4 Section 06 16 53 – Moisture Resistant Sheathing

.5 Section 07 62 00 – Sheet Metal Flashings

.6 Section 07 92 00 – Sealants

.7 Section 22 42 01 – Plumbing Specialties and Accessories

1.2 REFERENCES

.1 ASTM International Inc.
- .1 ASTM D41M-11(2016), Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- .2 ASTM D2178/D2178-15a, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- .3 ASTM D6163/D6163M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
- .4 ASTM D6164/D6164M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 CRCA Roofing Specifications Manual-2012.

.4 Canadian Standards Association (CSA International)
- .1 CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
- .2 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
.1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish, installation and limitations.

.3 Provide shop drawings:
.1 Indicate flashing and installation details along as tapered insulation design.

.4 Manufacturer's Installation Instructions: indicate special precautions required for lapping the membrane.

1.4 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems recognized by manufacturer.

1.5 FIRE PROTECTION

.1 Fire Extinguishers:
.1 Maintain cartridge operated type with hose and shut-off nozzle.
.2 ULC labelled for A, B and C class protection.
.3 Size: 5lbs minimum, on roof, one per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 10 - General Instructions.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Comply with manufacturer's written requirements for each product

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.9 WARRANTY

.1 For the work of this Section 07 52 00, the 12 month warranty period is extended to 24 months.

PART 2 PRODUCTS

2.1 PERFORMANCE CRITERIA

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

.2 All materials and products of this Section to be by single roofing manufacturer.

.3 Roofing System: tested to CSA A123.21 for wind uplift resistance of actual building conditions.

2.2 EXISTING VAPOUR BARRIER PRIMER

.1 Roof membrane primer as recommended by roofing manufacturer

2.3 VAPOUR BARRIERS

.1 95 g/m² SBS modified bitumen membrane with polyethylene facer, minimum 0.8 mm thickness.
.2 Mopped applied at Hangar T-58; membrane must be a sanded top surface for mopped applications. Torched applied self-adhesive membrane at Building O-276.

2.4 MEMBRANES

.3 Hangar T-58; hot-mopped applied base sheet, for use as two-ply membrane on all non-combustible horizontal surfaces. Type 1a, for exposed roofing, fully adhered (hot mopped applied), Class C – plain surfaced, Grade 2 –Heavy Duty Service, and sand/polyethylene top and bottom surfaces.

.4 Building O-276: torch applied base sheet (for use as two-ply membrane on all non-combustible horizontal and vertical wall surfaces. Type 1a, for exposed roofing fully adhered (torch applied), Class C – plain surfaced, Grade 2 – Heavy Duty Service, and polyethylene/polyethylene top and bottom surfaces.

.2 Base sheet: to CGSB 37-GP-56M and ASTM D6163.
  .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, glass reinforcement to 180 g/m3
  .2 Thickness: minimum 2.5 mm.

.3 Cap sheet and flashing: to CGSB 37-GP-56M and ASTM D6164.
  .1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, polyester reinforcement to 250 g/m3
  .2 Thickness: minimum 3 mm.
  .3 Surfaces:
    .1 Top: sanded, standard colour to be selected by Departmental Representative
    .2 Bottom: Self-adhesive

2.5 ADHESIVE AND PRIMERS

.1 Adhesive: as recommended by membrane manufacturer.

.2 Primer for self-adhesive membrane installation; as recommended by membrane manufacturer.

2.6 DECK SHEATHING BOARD

.1 12mm thick glass mat water-resistant siliconized gypsum core sheathing board to Section 06 16 53 – Moisture Resistant Sheathing

2.7 POLYISOCYANURATE INSULATION

.1 Main Field:
- .1 Closed cell polyisocyanurate foam bonded on top and bottom sides to an organic / inorganic facer. Board size not to exceed 1200 x 2400mm. Insulation to meet CAN/CGSB 51.26-86M and CAN/ULC S704-01.
  - .1 Thickness: as indicated
  - .2 Compressive strength: minimum 110kPa in accordance with ASTM D1621

.2 Parapet Perimeter and pedestrian accessible roof areas:
- .1 Closed cell polyisocyanurate foam bonded on top and bottom sides to an organic / inorganic facer. Board size not to exceed 1200 x 2400mm. Insulation to meet CAN/CGSB 51.26-86M and CAN/ULC S704-01.
  - .1 Thickness: as indicated
  - .2 Compressive strength: minimum 170kPa in accordance with ASTM D1621

2.8 SLOPED INSULATION

.1 Acceptable material: Tapered polyisocyanurate insulation.

2.9 OVERLAY/PROTECTION BOARD

.1 Semi-rigid asphaltic board comprised of saturated fiberglass felt on each side of mineral fortified asphaltic core, minimum 6mm thickness. Provide fire-guard tape for seams to prevent fire spread during torch application of membranes.

2.10 EQUIPMENT SUPPORTS

.1 Concrete pavers: to CSA A231.1, precast concrete paving slabs with non-slip finish, nominal 40 mm thickness

.2 Rubber mat: thickness as indicated, minimum 975 kg/m3 density to ASTM D3676, purpose made for roof applications.

2.11 CANT STRIPS (IF REQUIRED BY Roofing Manufacturer)

.1 Fibre, fibreboard or other products as recommended by roofing manufacturer. Profiles and sizes as required

2.12 FASTENERS

.1 Deck sheathing to steel deck: No. 10 flat head, self-tapping, Type A or AB, cadmium plated screws to CSA B35.3 complete with washers.

.2 Provide curb fasteners for concrete/asbestos deck at Hangar T-58, and fasteners/plates for “insulation cap” at Building O-276.

.3 Insulation to deck: fasteners and plates must meet Factory Mutual 4470 Standard for wind

uplift and corrosion resistance and CSA wind uplift requirement.

.4 Termination bars: cadmium plated metal termination bars, type as recommended by Roof manufacturer.

2.13 PREFABRICATED EXPANSION JOINTS.

.1 Monolithic expansion joint made of EPDM-based synthetic rubber consisting of two (2) flanges coated on the surface and underface with a woven oxidized and stabilized polyacrylonitrile, with an expandable core.

2.14 SEALANT

.1 Silicone, one part, modulus of elasticity to accommodate joint substrate and design.

PART 3 EXECUTION

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual.

.2 Do priming in accordance with manufacturers written recommendations.

3.2 EXAMINATION OF ROOFING SUPPORT

.1 Verification of Conditions:
  .1 Inspect substrate conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed. Immediately inform Departmental Representative of unacceptable conditions and await written instruction prior to proceeding with work

.2 Evaluation and Assessment:
  .1 Prior to beginning of work ensure:
    .1 Existing substrates are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
    .2 Curbs have been built and secured to deck, see Rough Carpentry Section.
    .3 Roof drains have been installed at proper elevations relative to finished roof surface.

.3 Do not install roofing materials during precipitation.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks, sloped roofs and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.5 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.

3.4 REMOVAL OF EXISTING ROOFING

.1 Existing roofing assembly including membranes, insulation, ballast, sloped insulation, metal flashing, etc. to be removed down to level of existing vapour barrier.

.2 Clean and prime surfaces of existing vapour barrier membrane in accordance with roofing manufacturer's printed recommendations, ready to receive a new vapour barrier.

.3 Remove, salvage for re-instatement all metal walkways, re-install upon completion of installation of the new roofing systems.

.4 Remove, salvage for reinstatement all mechanical and electrical systems, refer to Mechanical and Electrical documents for extent. Fully co-ordinate removal and re-instatement work between all trades.

3.5 PRIMING CONCRETE SUBSTRATE

.1 Where the existing concrete deck is exposed due to the removal of the existing roofing assembly, apply deck primer to concrete roofing substrate at rate recommended by roofing manufacturer.

3.6 VAPOUR BARRIER

.1 Adhere vapour barrier using solvent based primer as per manufacturer's instructions.

.2 Mopped applied at Hangar T-58 and torched applied self-adhesive membrane at Building O-276.

3.7 MEMBRANE ROOFING APPLICATION

.1 All materials to be installed in accordance with Manufacturer’s recommendations.

.2 Deck sheathing application:
- .1 Install sheathing boards continuously over roof deck and secure with mechanical fasteners in accordance with manufacturer’s instructions for roof membrane installation and wind-uplift requirements.

.3 Vapour barrier application:
- .1 Apply vapour barrier continuously over substrate. Lap all joints minimum 100mm.

.4 Insulation:
- .1 Mechanically fastened application for Building O-276 and mop-applied application for Hangar T-58.
- .2 Mechanically fasten insulation using screws and pressure distribution plates for Building O-276.
- .3 Number and pattern of screws per board to meet Factory Mutual I-20 requirements.

.4 Embed insulation in adhesive in accordance with manufacturer's printed instructions for Hangar T-58.
.5 Place boards in parallel rows with ends staggered, and in firm contact with one another.
.6 Cut end boards to suit
.7 Install high density insulation board continuously adjacent to parapets and extend minimum 1500mm towards centre of building. Install high density insulation within areas accessible to roof maintenance and roof traffic.

.5 Sloped insulation application
.1 Mop insulation to first layer of insulation with hot asphalt at rate of 2 kg/m² in accordance with the manufacturer's recommendation at Hangar T-58.
.2 Install tapered insulation as second insulation layer, in accordance with shop drawings. Stagger joints between layers 6" minimum. Adhere tapered insulation to base insulation with adhesive in accordance with roofing manufacturer's recommendations.
.3 Mechanically fastened tapered insulation at Building O-276, as per tapered insulation Manufacturer's instructions.

.6 Overlay Board application:
.1 For Hangar T-58, mop apply overlay/protection board to insulation with hot asphalt at rate of 2 kg/m² in accordance with roofing manufacturer's recommendations.
.2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.
.3 At Building O-276, mechanically fastened the overlay/protection board to manufacturer's recommendations.

.7 Cants:

.1 Secure cants as required by roofing membrane manufacturer.

.8 Base sheet application:
.1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends
.2 Unroll and adhere base sheet in accordance with roofing manufacturer, mop-applied for Hangar T-58 and torch-applied for Building O-276..
.3 Lap sheets 75mm minimum for side and 150mm minimum for end laps
.4 Application to be free of blisters, wrinkles and fishmouths.
.5 Do membrane application in accordance with manufacturer's recommendations.

.9 Cap sheet application:
.1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
.2 Unroll and adhere cap sheet as per manufacturer's instructions
.3 Lap sheets 75mm minimum for side laps and 150mm minimum for end laps. Offset joints in cap sheet 300mm minimum from those in base sheet.
.4 Application to be free of blisters, fishmouths and wrinkles.
.5 Do membrane application in accordance with manufacturer's recommendations.

.10 Flashings:
.1 Complete installation of flashing base sheet prior to installing membrane cap

sheet.

.2 Adhere base and cap sheet onto substrate in 1 metre wide strips, offset laps.

.3 Lap flashing base sheet to field base sheet minimum 150 mm and adhere. Seal by mopping or torch welding.

.4 Lap flashing cap sheet to field cap sheet 250 mm minimum and torch weld. De-granulate field cap sheet prior to flashing installation.

.5 Provide 75 mm minimum side lap and seal.

.6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.7 Do work in accordance with manufacturer's recommendations

.11 Roof penetrations:

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

3.8 EQUIPMENT SUPPORT

.1 Install concrete paving slabs as indicated.

.2 Install pavers, level on rubber pads, as indicated.

3.9 EXPANSION JOINT INSTALLATION

.1 Install in accordance with manufacturer’s instructions.

3.10 CLEANING

.1 Remove bituminous markings from finished surfaces.

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 07 92 00 – Joint Sealants

1.2 REFERENCES

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

.1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.2 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 Canadian Roofing Contractors Association (CRCA)

.1 Roofing Specifications Manual 2012.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal colour finishes.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 WASTE MANAGEMENT

.1 Separate waste materials in accordance with Section 01 00 10 - General Instructions.

PART 2 Products

2.1 SHEET METAL MATERIALS

.1 Sheet Metal: Minimum 0.76 mm base metal thickness, grade 33 steel, galvanized

sheet steel to ASTM A653, Z275 coating designation, pre-painted colour to be selected from complete 8000 Series selection

2.2 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 00 - Sealants.

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

.3 Fasteners: screw fasteners of same material as sheet metal, length and thickness suitable for application, complete with neoprene washers where fasteners are to be exposed.

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

2.3 FABRICATION

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

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

.3 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

.6 Overlap pieces by minimum 50mm and seal with sealant in accordance with Section 07 92 00 – Joint Sealants

2.4 METAL FLASHINGS

.1 Form flashings, caps, copings and fascias to profiles indicated.
.1 Provide slotted fixing holes and steel washer fasteners

2.5 SCUPPERS

.1 Sizes and profiles as indicated.

.2 Provide necessary fastenings.

PART 3 Execution

3.1 INSTALLATION

.1 Install sheet metal work in accordance with CRCA FL Series.

.2 Use concealed fastenings except where approved before installation.

.3 Install metal flashing as details on the project drawings including but not limited to parapet caps, roof penetrations curbs, structural steel roof structure curbs, etc.
.1 Flash joints using S-lock forming tight fit over hook strips, as detailed.

.4 Lock end joints and caulk with sealant.

.5 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.6 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm at masonry veneered walls. Lead wedge flashing securely into joint.

.7 Caulk flashing at cap flashing with sealant, refer to Section 07 92 00 – Joint Sealants.

3.2 CLEANING

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

.2 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.02 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC).
- .1 CAN/ULC S101-14, Standard Method of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC S102, Standard Method of Test for Burning Characteristics of Building Materials and Assemblies.
- .3 CAN/ULC S115-11, Fire Tests of Fire stop Systems.

1.03 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
- .2 Construction details should accurately reflect actual job conditions.

.4 Quality assurance submittals:
- .1 Test reports: in accordance with CAN/ULC S101 for fire endurance and CAN/ULC S102 for surface burning characteristics.
  - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .3 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.04 QUALITY ASSURANCE

.1 All firestopping to be performed by a single company experienced in the installation of firestopping.

.2 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work is

complete, but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 All firestopping components, systems and assemblies to be by a single manufacturer for this Project.

.2 Fire stopping and smoke seal systems: in accordance with CAN/ULC S115.
.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3 .
.2 Firestop system rating: to meet or exceed fire resistance rating of assembly.

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

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

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

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

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

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

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

.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: non-sagging.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.02 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.03 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

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

3.04 SPECIAL REQUIREMENTS

.1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:
.1 Movement: up to 50mm deflection at top of non-loadbearing wall

assemblies.

3.05 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.4 Mechanical pipe insulation: certified fire stop system component.
- .1 Ensure pipe insulation installation precedes fire stopping.

3.06 FIELD QUALITY CONTROL

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.07 CLEANING

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

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.08 SCHEDULE

.1 Fire stop and smoke seal at:
- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Top of fire-resistance rated masonry and gypsum board partitions.
- .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .6 Openings and sleeves installed for future use through fire separations.
- .7 Around mechanical and electrical assemblies penetrating fire separations.
- .8 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire

stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 07 52 00 Modified Bituminous Membrane

.3 Section 07 62 00 – Sheet Metal Flashings

1.2 REFERENCES

.1 ASTM

.1 ASTM C 920-14a, Standard Specification for Elastomeric Joint Sealants

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit 2 samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are within the widths allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are completely removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

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

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Urethanes one part:

.1 Non-sag, low VOC

.2 Type S, Grade NS, Class 50, Use NT, T, M, A, O to ASTM C920

.3 Minimum service temperature range: -40 to +80 degrees C

.4 Primer: as recommended by sealant manufacturer

.2 Preformed compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded open cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Bond breaker tape:

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

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

.1 Completely remove all existing caulking and existing residue on all precast joint surfaces

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

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

.4 Apply primer to existing substrate surfaces to receiving sealant. Do not prime compressible back-up materials

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

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant:

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

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

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

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

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

.7 Tool as recommended by sealant manufacturer exposed surfaces before skinning begins to give slightly concave shape.

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

.2 Curing:

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

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

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.1 Leave Work area clean at end of each day.

.2 Clean adjacent surfaces immediately.

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

.4 Remove masking tape after initial set of sealant.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION