

**Part 1 General****1.1 SCOPE**

- .1 The Scope of the work of this Section is to repair and patch existing roofing in the affected work area only.

**1.2 RELATED REQUIREMENTS**

- .1 Division 01 – General Requirements
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim
- .3 Section 07 92 00 – Joint Sealants

**1.3 REFERENCES**

- .1 ASTM International
  - .1 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - .2 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .3 ASTM C1396/C1396M-09, Standard Specification for Gypsum Board.
  - .4 ASTM D4434-09, Standard for Poly (Vinyl Chloride) Sheet Roofing.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canadian Roofing Contractors Association (CRCA)
  - .1 CRCA Roofing Specifications Manual-1997.
- .4 CSA International
  - .1 CSA A123.21-04(R2009), Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
  - .2 CSA O121-08, Douglas Fir Plywood.
  - .3 CSA O151-09, Canadian Softwood Plywood.
- .5 Green Seal Environmental Standards (GSES)
  - .1 GS-36-00, Adhesives for Commercial Use.
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.

- .3 CAN/ULC-S770-09, Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Convene pre-installation meeting one week prior to beginning roofing Work, with Superintendent Third Party, roofing contractor's representative, Departmental Representative and roofing Inspector to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 00 10- Submittal Procedures.
- .2 Product Data:
  - .1 Provide copies of most recent technical roofing components datasheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit copies of WHMIS MSDS – Material Safety Data Sheets.
    - .1 Indicate VOC content for:
      - .1 Primers.
      - .2 Sealers.
      - .3 Filter fabric.
- .3 Shop Drawings:
  - .1 Indicate flashing details.
  - .2 Provide layout for tapered insulation.
- .4 Provide written confirmation from membrane manufacturer that applicator is an authorized applicator.
- .5 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .6 Test and Evaluation Reports: submit laboratory test reports certifying compliance of roofing materials and membrane with specification requirements.
- .7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .8 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .9 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

#### **1.6 QUALITY ASSURANCE**

- .1 Installer Qualifications: company or person specializing in application of PVC roofing systems.
- .2 Mock-ups:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

- .2 Construct mock-up showing typical lap joint, one inside corner one outside corner. Accepted mock-up may form part of complete work.
- .3 Allow 24 hours for inspection of mock-up by Departmental Representative and Third Party Roofing Consultant before proceeding with roofing work.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
  - .2 Provide and maintain dry, off-ground weatherproof storage.
  - .3 Store rolls of PVC flat on cross supports.
  - .4 Remove only in quantities required for same day use.
  - .5 Store materials in accordance with manufacturer's written instructions.
  - .6 Store insulation protected from sunlight, weather and deleterious materials.

## **1.8 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Temperature, relative humidity, moisture content.
    - .1 Apply PVC membrane only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
    - .2 Do not install PVC membrane when temperature remains below 5 degrees C, or when wind chill gives equivalent cooling effect.
    - .3 Install PVC membrane on dry substrate, free of snow and ice. Use only dry materials and apply only during weather that will not introduce moisture into system.
- .2 Ventilation:
  - .1 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.
  - .2 Ventilate enclosed spaces.
  - .3 Provide continuous ventilation during and after roofing application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of roofing installation.
- .3 The Applicator is cautioned that certain PVC membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with the PVC membranes. The Applicator shall consult membrane manufacturer regarding compatibility, precautions and recommendations.
- .4 The Applicator shall take precautions that storage and application of materials and equipment does not overload the roof deck or building structure.

**1.9 EXTENDED WARRANTY**

- .1 For the work of this Section 07 54 19 - Polyvinyl-Chloride Roofing, 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 and membrane must be walkable type to allow maintenance of roofing equipment.
  - .1 Provide written declaration to Departmental Representative and Third Party Roofing Consultant stating that materials and components, as assembled in system, meet this requirement.
- .2 Roofing System: to CSA A123.21 for wind uplift resistance.

**2.2 DECK COVERING**

- .1 Glass Mat Gypsum Roof Board: for cold adhered installation over steel deck to ASTM C 1177. Boards to be 1.2m x 2.4m, thickness 13.0mm (1/2") with pre-primed surface. Counter flashings to be 13mm thick boards pre-primed where specified.
- .2 Plywood:
  - .1 To CSA O121 or CSA O151 treated with pre-primed surface.

**2.3 VAPOUR RETARDER**

- .1 Polyethylene: to CAN/CGSB -51.34, Type 1, 0.25mm thick.

**2.4 MEMBRANE**

- .1 Flexible polyvinyl chloride PVC sheet membrane: to ASTM D4434.

**2.5 POLYISOCYANURATE INSULATION**

- .1 To CAN/ULC-S704, Type 2, class 2 or 3, size 1.2m x 1.2m square edge. To be mechanically fastened in base layer, followed by adhesive application in other remaining layers. Minimum 2" (50mm) each layer. Installed insulation to match existing roof insulation thickness and a min R-10 thermal resistance value.

**2.6 ADHESIVE AND SOLVENTS**

- .1 Solvent-based adhesives: as recommended by membrane manufacturer.
- .2 Solvent: as recommended by membrane manufacturer.

**2.7 SEALERS**

- .1 Sealants: As recommended by membrane manufacturer, see Section 07 92 00-Joint Sealants.

**2.8 WALKWAYS**

- .1 Entire work area of PVC roof membrane to be treated as walkway. Provide Necessary PVC material, thickness to maintain membrane warranty and protect from maintenance staff damage.

**2.9 FASTENERS**

- .1 Covering to steel deck: No.10 flat head, self tapping, Type A or AB, cadmium plated screws to ASTM C1002.
- .2 Insulation to substrate: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation of membrane manufacturer.
- .3 Membrane to substrate: fasteners and spacing as recommended by manufacturer.

**2.10 ACCESSORIES**

- .1 Edge and fascia flashings: PVC clad galvanized steel.
- .2 Steel termination strips, "U" shaped steel channels, PVC cord, distribution plates as recommended by membrane manufacturer.

**2.11 SOURCE QUALITY CONTROL**

- .1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.
- .2 Submit glass transition temperature of all PVC materials considered for use on this project, 'as manufactured' and after heat-aging for 28 days at 100 degrees C. The increase in the glass transition temperature (Tg) shall not exceed 5 degrees C regardless of its value.

**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 particularly for fire safety precautions.
- .2 The interface of the walls and roof assemblies will be fitted with durable rigid material plywood providing connection point for continuity of air barrier.
- .3 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

**3.2 EXAMINATION OF ROOF DECKS**

- .1 Verification of Conditions: inspect with Departmental Representative Third Party & Roofing Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment: prior to beginning of work ensure:
  - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
  - .2 Curbs have been built.
  - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
  - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.

**3.3 PROTECTION OF IN-PLACE CONDITIONS**

- .1 Cover walls, slopped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Dispose of rain water away from face of building until drains or hoppers installed and connected.
- .4 Protect from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .5 Place plywood runways over work to enable movement of material and other traffic.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.
- .7 Seal and ballast exposed edges.

**3.4 DECK SHEATHING**

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

**3.5 VAPOUR RETARDER**

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

**3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION**

- .1 Insulation: fully adhered, adhesive application:
  - .1 Adhere insulation to laminated vapour barrier using solvent-based adhesive.
  - .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
  - .3 Cut end pieces to suit.
  - .4 Apply adhesive in continuous ribbons at 300 mm on centre.
  - .5 Separate the membrane and insulation with a drainage layer or slip sheet.
- .2 Tapered insulation application:
  - .1 Mop insulation to vapour retarder and top layer of insulation to bottom layer with adhesive at rate of 1 kg/m<sup>2</sup>.
  - .2 Install tapered insulation in accordance with shop drawings. Stagger joints between layers 150 mm minimum.
- .3 Insulation: mechanically fastened application:
  - .1 Mechanically fasten insulation using reversible mechanical attachments.
  - .2 Fasten insulation as per manufacturer's written recommendations.
  - .3 Number and pattern of screws per board to meet Factory Mutual requirements.
  - .4 Place boards in parallel rows with ends staggered, and in firm contact with one another.
  - .5 Cut end boards to suit.

- .4 Membrane:
  - .1 Install fully adhered membrane and flashings in accordance with ASTM D4434 and manufacturer's written instructions.
- .5 Flashings:
  - .1 Install PVC membrane flashings in accordance with manufacturer's written instructions.
- .6 Roof penetrations:
  - .1 Install roof drain pans, vent stack covers and other penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

### **3.7 WALKWAYS**

- .1 Install walkway PVC in accordance with manufacturer's instructions as indicated.

### **3.8 FIELD QUALITY CONTROL**

- .1 Inspection:
  - .1 Inspection and testing of membrane application will be carried out by testing laboratory designated by Departmental Representative.
  - .2 Costs of tests will be paid under cash allowance.

### **3.9 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Clean to Departmental Representative's approval, soiled surfaces, spatters, and damage caused by work of this Section.
- .4 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

**END OF SECTION**