

Part 1 General

1.01 SUMMARY

- .1 Section Includes:
 - .1 Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.
 - .2 Vapour retarder
 - .3 Roof insulation
 - .4 Walkways
 - .5 Base flashings roofing membrane expansion joints and counter flashings.
 - .6 Inspection and testing protocols.

1.02 RELATED REQUIREMENTS

- .1 Section 07 62 00 - Sheet Metal Flashing and Trim: For metal flashings.
- .2 Section 07 92 00 – Joint Sealing

1.03 ABBREVIATIONS

- .1 Abbreviations and Acronyms used in this Section:
 - 1. XPS - Extruded Polystyrene Board Insulation
 - 2. EPS - Expanded Polystyrene Board Insulation
 - 3. ISO - Rigid Cellular Polyisocyanurate Board Insulation
 - 4. MFB - Mineral Fibre Board Insulation

1.04 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/SPRI/RCI NT-1 (2017), Detection and Location of Latent Moisture in Building Roofing Systems by Nuclear Radioisotopic Thermalization
- .2 ASTM
 - .1 ASTM C1177/C1177M, Specification for Glass Mat Gypsum Substrate for Use as a Sheathing
 - .2 ASTM D3617 – 83 (1994), Standard Practice for Sampling and Analysis of New Built-Up Roof Membranes
 - .3 ASTM D7954. Electrical Capacitance/Impedance Testing:
 - .4 ASTM E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials
 - .5 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - .6 ASTM E783 - 02(2018), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 - .7 ASTM C1153 - 10(2015), Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging
 - .8 ASTM E1186 - 17, Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems

- .9 ASTM E2357 - 18, Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies
- .10 ASTM D3617 / D3617M - 17, Standard Practice for Sampling and Analysis of Built-Up Roof Systems During Application
- .11 ASTM D4541 -17, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- .12 ASTM D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- .13 ASTM D5957 - 98(2013), Standard Guide for Flood Testing Horizontal Waterproofing Installations
- .14 ASTM D7954 / D7954M - 15a, Standard Practice for Moisture Surveying of Roofing and Waterproofing Systems Using Non-Destructive Electrical Impedance Scanners
- .3 Canadian Standards Association (CSA)
 - .1 CSA A123.3, Asphalt or Tar Saturated Roofing Felt
 - .2 CSA A123.4, Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems
 - .3 CSA A123.21:20, Standard test method for the dynamic wind uplift resistance of membrane-roofing systems
 - .4 CSA A123.23, Polymer-Modified Bitumen Sheet, Prefabricated and Reinforced.
 - .5 CSA A231.1, Precast Concrete Paving Slabs
 - .6 CAN/CSA-A247, Insulating Fibreboard
 - .7 CSA A284, Mineral Aggregate Thermal Roof Insulation
 - .8 CSA B35.3, Tapping and Drive Screws (Slotted and Recessed Head, Thread)
 - .9 CSA O121, Douglas Fir Plywood
 - .10 CSA O151, Canadian Softwood Plywood
- .4 CRCA (Canadian Roofing Contractors' Association)
 - .1 CRCA Roofing Specifications Manual
- .5 National Roofing Contractors Association (NRCA)
 - .1 Quality Control and Quality-Assurance Guidelines for the Application of Membrane Roof Systems (Electronic)
- .6 Underwriters Laboratories Canada (ULC)
 - .1 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .2 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC-S704, Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced
 - .4 CAN/ULC-S706, Insulated Fiberboard

1.05 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning roofing Work, with roofing contractor's representative, Contract Administrator and Consultant 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.

- .5 Review hot work safety requirement.
- .2 Coordination:
 - .1 Coordinate the work of this Section with the commissioning requirements specified in article 3.12.

1.06 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Product Data: Provide manufacturer's product data sheets for roofing materials installed on project.
- .3 Shop Drawings: Indicate flashing details. Indicate layout for tapered insulation.
- .4 Qualification Data: For Subcontractor and installer.
- .5 Product Test Reports: For each roof system membrane, for tests performed by an independent testing agency.
- .6 Field quality-control reports.

1.07 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Roofing Subcontractor: Must be a member in good standing of the Roofing Contractors Association of Manitoba and the Canadian Roofing Contractors' Association.
 - .2 Installer Qualifications: Company or person specializing in application of modified bituminous roofing systems with five years documented experience approved by manufacturer.
 - .3 Workers: Workers performing roofing work must be skilled and employed by a company recognized and trained as an approved applicator by the roofing materials manufacturer, and must have in their possession proof of their participation in the training course run by the roofing manufacturer for the specified products.
- .2 Compatibility: Ensure compatibility between components of roofing system is essential. Provide written declaration to [Contract Administrator] stating that materials and components, as assembled in system, meet this requirement. Refer to article FIELD QUALITY CONTROL.
- .3 Source Quality Control:
 - .1 Submit laboratory test reports in accordance with Section 01 40 00 - Quality Requirements.
 - .2 Submit laboratory test reports certifying compliance of bitumens and roofing sheets and membranes with specification requirements.
- .4 Manufacturer's representative to provide on-site inspection, technical assistance and application instructions to ensure proper installation of vapour retarder and roof membrane systems. The Contractor to include all costs for manufacturer's inspection in his bid price.
 - .1 Manufacturer's representative field services are described in article FIELD QUALITY CONTROL.

1.08 STORAGE AND HANDLING

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

- .2 Store rolls of felt in upright position. Store membrane rolls with selvage edge up.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over work to enable movement of material and other traffic.
- .5 Store caulking at +5°C minimum.
- .6 Store insulation protected from daylight and weather and deleterious materials.

1.09 SITE CONDITIONS

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

1.10 WARRANTY

- .1 For Work of this Section, twelve-month warranty period is extended to five years.
- .2 Modified Bituminous Membrane Manufacturer's Guarantee: Provide manufacturer's written non-pro-rated warranty against failure of roofing system, leakage for a period of 15 years from the date of Substantial Completion of Work as agreed upon by Contract Administrator, Contractor, roofing Subcontractor and membrane manufacturer. Guarantee shall cover but not be limited to:
 - .1 Labour and material for repair, replacement of roofing components from the structural deck up.
 - .2 Leakage, failure of roofing system due to natural causes.
 - .3 Non-prorated warranty.

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Comply with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, and Waste Reduction Work Plan.

Part 2 Products

2.01 PERFORMANCE AND DESIGN CRITERIA

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Contract Administrator stating that materials and components, as assembled in system, meet this requirement.
- .2 Roofing System: CSA A123.21 for wind uplift resistance

2.02 DECK PRIMER

- .1 Primer: Type recommended by membrane manufacturer, applicable for substrate and application.

2.03 VAPOUR RETARDER

- .1 Self-Adhesive Vapour Retarder: Self-adhesive SBS modified bitumen sheet, selvage edge, top surface sanded; bottom surface silicone release paper.
 - .1 Thickness: 3 mm.
 - .2 Water Vapour Transmission: < 2.5 ng/Pa•s•m² (< 0.04 perm) tested to ASTM E96.

- .3 Acceptable Products: Sopraply Stick Duo as manufactured by Soprema.

2.04 MEMBRANE

- .1 High-Density Polyisocyanurate Board and Base Sheet Membrane:
 - .1 Description: Board composed of SBS modified bitumen membrane with a polyester reinforcement, factory-laminated on a high-density polyisocyanurate board. The board measures 0.91m x 2.44m (3ft x 8ft). The surface is sanded. The membrane side lap is provided with DUO SELVEDGE technology.
 - .2 Thickness: 15mm (19/32 in)
 - .3 Acceptable Products: 2-1 SOPRASMART ISO HD Sanded by Soprema.
- .2 Cap Sheet: CSA A123.23 Type C, Grade 1, self-adhesive high performance cap sheet membrane with a composite reinforcement and SBS modified bitumen.
 - .1 Top and Bottom Surfaces:
 - .1 Granules / split back silicone release film.
 - .2 Acceptable Products: Sopraply Stick Traffic Cap as manufactured by Soprema.
- .3 Base Sheet Flashing Membrane (Stripping): CSA A123.23 Type C, Grade 3, self-adhesive base sheet membrane with a composite reinforcement and SBS modified bitumen.
 - .1 Top and Bottom Surfaces:
 - .1 Sanded / split back silicone release film.
 - .2 Acceptable Products: Sopraply Stick Duo as manufactured by Soprema.
- .4 Cap Sheet Flashing Membrane (Stripping): Same as cap sheet.
- .5 Cover Strip: Membrane strip of 330mm (13 in) made of SBS modified bitumen with a composite reinforcement. The self-adhesive underface is covered by a release protection film and the surface is sanded. The strip ensures water-tightness in the end laps.

2.05 ROOFING INSULATION

- .1 Rigid Cellular Polyisocyanurate Insulation (ISO): CAN/ULC-S704, Type 2, compressive strength 138 kPa (20 psi), polymer coated facers both sides, board size 1 219 by 1 219 mm, thickness indicated. Flame spread classification: less than 500.
 - .1 Acceptable Products: Sopra-ISO PLUS
- .2 Sloped Insulation:
 - .1 ISO is necessary to conform with CSA A123.21 requirement. Rigid Cellular Polyisocyanurate Insulation (ISO): CAN/ULC-S704, Type 2, polymer coated facers both sides, cut to tapered shapes for slopes to match existing.

2.06 PRIMERS, SEALERS, ADHESIVES

- .1 Primer for Self-Adhesive Membranes: Primer composed of SBS synthetic rubber, adhesive resins and volatile solvents. Used as primer to improve the adhesion of self-adhesive membranes.
 - .1 Acceptable product: ELASTOCOL STICK by Soprema.
- .2 Waterproofing Mastic multi-purpose mastic composed of SBS modified bitumen, fibres, [aluminium pigments,] mineral fillers and solvents. Where exposed in final assembly use product with aluminum pigment or cover with colour matched granules.
 - .1 Acceptable Product: Soprema Sopramastic or Sopramastic ALU.

- .3 Pitch Pocket Filler: Aluminum coloured, solvent and SBS modified bitumen based mastic.
- .4 Roofing Adhesive: Two-component, quick-setting, low-expansion foam urethane adhesive for bonding insulation boards and laminated base sheet panels, deck covering. Complete with manufacturer's recommended multi-bead applicator:
 - .1 Acceptable Product: DUOTACK.
- .5 Adhesive for Membrane Detailing: Low VOC, 100% solid, odourless polyether based cold-applied adhesive for SBS modified polymer.
 - .1 Acceptable Product: COLPLY EF Flashing by Soprema.

2.07 WALKWAYS

- .1 SBS modified bitumen cap sheet of same type use on roofing assembly for heat welded application. Granular surface in contrasting colour. Full roll width with selvedge edge removed.

Part 3 Execution

3.01 WORKMANSHIP

- .1 Do roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual
- .2 Prepare surfaces and complete waterproofing work in conformance with roofing manufacturer's instructions.
- .3 Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.
- .4 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.
- .5 Seal all seams not covered by cap sheet membrane in the same day. Do not install cap sheet if any moisture is present at/in the base sheet seams.
- .6 Whenever Membranes are Torch-Applied:
 - .1 Ensure a continuous and even bead of molten bitumen is visible as the membrane is unrolled and torched.
 - .2 Use only torch equipment recommended by the roofing manufacturer.
 - .3 During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.
 - .4 Avoid overheating. Avoid excessive bitumen bleed-out at joints.
 - .5 Make sure joints between the two layers are staggered by at least 300 mm.
 - .6 De-granulate overlap surfaces.
 - .7 Complete perfect welds between two membranes. Leave no zone un-welded. In cold weather, adjust welding time to obtain homogenous seam.
 - .8 Inspect seams and overlapped joints and repair defective work.

3.02 PREPARATION

- .1 Cover walls and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of work.
- .3 Clean off drips and smears of bituminous material immediately.

- .4 Dispose of rainwater off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Contract Administrator.
- .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.

3.03 EXAMINATION ROOF DECKS

- .1 Examine roof decks and immediately inform of Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
 - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

3.04 VAPOUR RETARDER

- .1 Modified Bituminous Sheet Vapour Retarder: Self-adhered to deck covering in accordance with manufacturer's instructions.
- .2 Ensure membrane is fully bonded to substrates and is free of air pockets, wrinkles, tears, and fishmouths. Overlap adjacent membranes by 75 mm, and end laps by 150 mm. Stagger end laps by at least 300 mm.

3.05 EXPOSED MEMBRANE ROOFING APPLICATION

- .1 Insulation:
 - .1 Adhere insulation by using specified adhesive in continuous strips spaced 12" on the field surface, 6" on the perimeter, and 4" on corners.
 - .2 All boards must be in perfect connection, without any significant variances in level, and must be completely adhered to the surface.
 - .3 All vertical joints between flat boards and sloped modules should be staggered.
 - .4 Install only as much insulation as can be covered in the same day.
- .2 Tapered Insulation Application:
 - .1 Mop insulation to vapour retarder and top layer of insulation to bottom layer with hot asphalt at rate of 1 kg/m²
 - .2 Install tapered insulation as first insulation layer in accordance with shop drawings. Stagger joints between layers 150 mm minimum.
 - .3 Adhere insulation by using specified adhesive in continuous strips spaced 12" on the field surface, 6" on the perimeter, and 4" on corners.
 - .4 All boards must be in perfect connection, without any significant variances in level, and must be completely adhered to the surface.
 - .5 All vertical joints between flat boards and sloped modules should be staggered.
 - .6 Install only as much insulation as can be covered in the same day.
- .3 Laminated Base Sheet Panel: Adhered.

- .1 Adhere base panel by using specified adhesive in continuous strips spaced 12" on the field surface, 6" on the perimeter, and 4" on corners.
- .2 All boards must be in perfect connection, without any significant variances in level, and must be completely adhered to the surface.
- .3 Adhere the first part of the self-adhesive side laps using a membrane roller, then heat-weld the last part (self-adhesive, heat-welded side laps).
- .4 Seal end laps by welding a 330mm (13in) wide protection strip centered on the joint.
- .5 Avoid the formation of wrinkles, swellings or fishmouths.
- .4 Installation of Self-Adhesive Cap Sheet on Field Surface:
 - .1 Apply self-adhesive membrane primer to the area to be covered.
 - .2 Starting at drain, unroll the cap sheet membrane on the base sheet, taking care to align the edge of the first selvedge with the edge of the roof.
 - .3 Cut off corners at end laps at areas to be covered by the next roll.
 - .4 Each selvedge will overlap the previous one laterally along lines provided for this purpose and will overlap by 150mm (6in) at the ends. Space end laps a minimum of 300mm (12 in).
 - .5 Remove the silicone release film, pressing down the membrane using a membrane roller to ensure good adhesion.
 - .6 Adhere the first part of the self-adhesive side laps using a membrane roller, then heat-weld the last part (self-adhesive, heat-welded side laps).
 - .7 Apply adhesive for the first 100 to 125mm (4 to 5in) of the end laps using a 4.8mm (3/16in) or a 6.0mm (1/4in) notched trowel.
 - .8 Complete the application by welding the last 25 to 50mm (1 to 2in) of the overlap to the field surface, using an electric hot-air welder and a membrane roller.
 - .9 Apply pressure on the whole surface with a membrane roller to ensure complete and uniform adherence.
 - .10 Repeat these steps to install the other membranes.
 - .11 Avoid the formation of wrinkles, swellings or fishmouths.
- .5 Base Sheet Flashing (Self-adhesive):
 - .1 Apply primer for self-adhesive membrane on the area to be covered at the foot of the parapets.
 - .2 Apply base sheet flashing only after primer coat is dry.
 - .3 Install base sheet by 1m (3.25ft) wide strips.
 - .4 Each selvedge will overlap the previous one along lines provided for this purpose, and by 150mm (6in) at the ends. Membranes for flashings must be spaced at least 100mm (4in) with respect to the cap sheet membranes on the field surface, to avoid areas of excessive membrane thickness.
 - .5 Cut off corners at end laps of areas to be covered by the next roll.
 - .6 Position the pre-cut membrane. Remove 150mm (6in) of the silicone release film to hold the membrane in place at the top of the parapet.
 - .7 Then, gradually peel off the remaining silicone release film, pressing down on the membrane with an aluminum applicator to ensure good adhesion. Use the aluminum applicator to ensure a perfect transition between the flashing and the field surface. Smooth the entire membrane surface with a membrane roller for full adhesion.
 - .8 Install a reinforcing gusset at all inside and outside corners.

- .9 Always seal overlaps at the end of the workday.
- .10 Avoid the formation of wrinkles, swellings or fishmouths.
- .6 Roof Penetrations:
 - .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with the manufacturer's recommendations and details.

3.06 WALKWAYS: MODIFIED BITUMEN MEMBRANE

- .1 Install SBS modified bitumen cap sheet of same type use on roofing assembly for heat welded application.
- .2 Application to be free of blisters, wrinkles and fishmouths.
- .3 Use full length pieces wherever possible. Butt joints and ensure corners and edges are fully bonded without raised edges.

3.07 FIELD QUALITY CONTROL

- .1 Refer to Section 01 40 00 - Quality Requirements.
- .2 Vapour Retarder and Roof Membrane Manufacturer's Field Services:
 - .1 Manufacturer's representative to attend site at regular intervals including not less than one visit at each of the following construction stages: 5%, 75% and 100%.
 - .1 Notify Contract Administrator 48 hours in advance of date and time of visits.
 - .2 Report in writing to Contractor, and Contract Administrator:
 - .1 Prior to Installation: Vapour retarder and roof membranes are designed in accordance with specified performance requirements, and that materials and components are compatible.
 - .2 Following Completion of Vapour Retarder and Roof Membrane: Vapour retarder and roof membranes are installed in compliance with manufacturer's instructions in compliance with all conditions of warranty.
 - .3 Manufacturer's Field Reports: Prepare and submit manufacturer's written reports within five days of review, verifying compliance of Work, as described in Article ACTION AND INFORMATIONAL SUBMITTALS and FIELD QUALITY CONTROL.
 - .4 Provide written inspection report to Contract Administrator.

3.08 INDEPENDENT INSPECTION AND TESTING

- .1 Comply with Section 01 40 00 - Quality Requirements.
- .2 Engage an independent inspection agency to test and inspect and roofing system installation.
 - .1 Cost for inspection and testing to be paid by Contractor.
 - .2 Acceptable Independent Inspection Agencies:
 - .1 D. K. Bennett & Associates Ltd.: 1118 Lorette Avenue, Winnipeg, Manitoba; Tel.: 204-452-6795; URL: <http://dkbennett.com>.
 - .2 Intertek Group; 356 Saulteaux Crescent, Winnipeg, Manitoba R3J 3T2; Tel.: 204 885 9300; URL: <http://www.intertek.com>.
 - .3 Pinchen Ltd.; 54 Terracon Place, Winnipeg, Manitoba R2J 4G7; Tel.: 204-452-0983; URL: <https://www.pinchin.com>.

- .3 QCA Building Envelope Ltd.; Box 23119, 1925 Pembina Hwy, Winnipeg, Manitoba R3T 2B3; Tel.: 204-371-0996; URL: <https://buildingenvelope.biz>.
- .3 Notify Contract Administrator 48 hours in advance of date and time of tests and inspections.
- .3 Vapour Retarders - Inspection and Testing:
 - .1 Inspections: Vapour retarder materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - .1 Continuity of vapour retarder system has been achieved throughout the building envelope with no gaps or holes.
 - .2 Continuous structural support of vapour retarder system has been provided.
 - .3 Site conditions for application temperature and dryness of substrates have been maintained.
 - .4 Maximum exposure time of materials to UV deterioration has not been exceeded.
 - .5 Surfaces have been primed.
 - .6 Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
 - .7 Termination mastic has been applied on cut edges.
 - .8 Vapour retarder has been firmly adhered to substrate.
 - .9 Compatible materials have been used.
 - .10 Transitions at changes in direction and structural support at gaps have been provided.
 - .11 Connections between assemblies (vapour retarder and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 - .12 All penetrations have been sealed.
 - .2 Tests: As determined by testing agency from among the following tests.
 - .1 Membrane-to-substrate tensile adhesion testing conducted in general accordance with ASTM D4541 for each 56 sq. m (600 sq. ft.) of installed air barrier or part thereof.
 - .1 When the product manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report to indicate whether this requirement has been met.
 - .2 Where the material manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.
 - .3 Vapour Retarders will be considered defective if they do not pass inspections and testing.
 - .1 Apply additional vapour retarder material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - .2 Remove and replace deficient vapour retarder components for retesting as specified above.
 - .4 Repair damage to vapour retarder caused by testing; follow manufacturer's written instructions.
- .4 Roofing - Inspection and Testing:

- .1 Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using an exposed metal electrical loop to create an electrical field tested with hand-held probes or a scanning platform having integral perimeter electrical loops creating a complete electrical field.
 - .1 Perform tests before overlying construction is placed.
 - .2 After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - .1 Cost of retesting is Contractor's responsibility.
 - .3 Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
- .2 Test Cuts: Remove test specimens to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - .1 Determine approximate quantities of components within roofing membrane according to ASTM D3617.
 - .2 Examine test specimens for interply voids according to ASTM D3617 and to comply with criteria established in Appendix 3 of NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - .3 Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
- .5 Frequency and timing of testing and inspections as determined by the independent inspection agency.
 - .1 Repair or remove and replace components of vapour retarder and roofing system where inspections indicate that they do not comply with specified requirements.
 - .2 Vapour retarder and roofing systems will be considered defective if they do not pass tests and inspections.
 - .1 Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.
 - .3 Prepare test and inspection reports.

3.09

CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION