SECTION  – sbs modified bituminous roofing - mech fastened

1. General
   1. summary
      1. This Section includes requirements for the supply and installation of mechanically fastened SBS modified bituminous membrane roofing system consisting of two (2) ply roofing membrane with mechanically fastened base sheet and torch applied cap sheet, insulation board, vapour barrier adhered to gypsum levelling board, all applied to steel roof deck substrate.
      2. Payment: Mechanically fastened modified bituminous roofing shall be identified as Alternate Price #1, as an alternate to Section 07 54 23 – Thermoplastic Polyolefin (TPO) Roofing.
      3. Related Requirements:
         1. Section 05 50 00 – Metal Fabrications.
         2. Section 06 10 00 – Rough Carpentry.
         3. Section 07 21 13 – Board Insulation.
         4. Section 07 21 16 – Blanket Insulation.
         5. Section 07 62 00 – Sheet Metal Flashing and Trim.
         6. Section 07 72 33 – Roof Hatches and Accessories.
         7. Section 07 92 00 – Joint Sealants.
   2. reference standards
      1. Canadian Roofing Contractors' Association (CRCA):
         1. Roofing Specification Manual.
      2. American Society for Testing and Materials (ASTM):
         1. ASTM D 4263 83 (2012), Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
      3. Canadian General Standards Board (CGSB):
         1. CGSB 37 GP 56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing.
         2. CGSB 37 GP 64M, Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-up Roofing.
         3. CAN/CGSB 37.5 M89, Cutback Asphalt Plastic Cement.
         4. CAN/CGSB 37.28 M89, Reinforced, Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and Waterproofing.
         5. CGSB 37 GP 9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing or Waterproofing.
      4. Canadian Standards Association (CSA):
         1. CSA A123.4 04(R2013), Asphalt for Constructing Built up Roof Coverings and Waterproofing Systems.
         2. CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs / Precast Concrete Pavers.
         3. CSA B111 1974 (R2003), Wires, Nails, Spikes and Staples.
         4. CSA O121 08(R2013), Douglas Fir Plywood.
         5. CSA O151 09(R2014), Canadian Softwood Plywood.
      5. Underwriters Laboratories Canada (ULC):
         1. CAN/ULC S107-10, Methods of Fire Tests of Roof Coverings.
         2. CAN/ULC S701 11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
         3. CAN/ULC S702 14, Standard for Mineral Fibre Thermal Insulation for Buildings.
         4. CAN/ULC S704 11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
   3. administrative requirements
      1. Pre-installation Conference: Convene pre-installation meeting prior to beginning roofing Work in accordance with requirements of Division 01 to review methods and procedures related to roofing system including, but not limited to, the following:
         1. Meet with Owner/Owner's representative, Consultant, Owner's insurer (if applicable), and other applicable parties whose work interfaces with or affects roofing.
         2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
         3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
         4. Review existing substrate conditions and finishes for compliance with requirements.
         5. Review structural loading limitations of roof deck during and after roofing.
         6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
         7. Review governing regulations and requirements for insurance and certificates as applicable.
         8. Review temporary protection requirements for roofing system during and after installation.
         9. Review roof observation and repair procedures during roofing installation.
         10. Review quality assurance and quality control procedures during roofing installation in accordance with requirements of Division 01.
         11. Temporary protection requirements for existing roofing system that is to remain during and after installation.
         12. HVAC shutdown and sealing of air intakes.
         13. Existing conditions that may require notification of Consultant before proceeding.
   4. submittals
      1. Submit two (2) copies of the roofing materials manufacturers' recommended inspection and maintenance procedures.
      2. Submit required Shop Drawings for roofing system. Include plans, elevations, sections, details, and attachments to other Work as applicable. Indicate details for the following:
         1. Base flashings and membrane terminations.
         2. Tapered insulation, including slopes.
         3. Crickets, saddles, and tapered edge strips, including slopes.
         4. Insulation fastening patterns.
         5. Control joints and expansion joints.
      3. Samples: submit samples in duplicates for the following:
         1. 300 mm x 300 mm (12” x 12”) square of sheet roofing of colour specified.
      4. Manufacturer's Certificate:
         1. Submit letter signed by manufacturer certifying that products meet or exceed specified requirements. Submit evidence of meeting performance requirements by submitting additional test and evaluation reports as well as conformance to applicable listings.
         2. Compatibility: Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.
   5. closeout submittals
      1. Final Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation. Submit manufacturer's inspection report within three (3) days of manufacturer representative's site visit and inspection.
   6. QUALITY ASSURANCE
      1. Source Limitations: Obtain components for membrane roofing system from one manufacturer, or from sources approved by roofing membrane manufacturer that will not void specified warranties. Mixing products across from various manufacturers without manufacturer's or Consultant's written permission is not permitted.
      2. Work of this Section shall be performed by a company which has a minimum of five (5) years of proven satisfactory experience in this type of work.
      3. Conform to Canadian Roofing Contractors' Association (CRCA) Specification Manual and Technical Bulletins as applicable, except where greater requirements are specified herein.
      4. Maintain equipment in good condition. Equip kettles with thermometers which will accurately register the temperature of bitumen at all times.
      5. Have representative of membrane manufacturer visit site at commencement of work and periodically thereafter to advise on workmanship, inspect work in progress, and to ensure that completed work will be satisfactory for issuing manufacturer's guaranty.
      6. Laboratory Results:
         1. Upon request from the owner, the electrometric asphalt manufactures shall supply, at their expense, the results of mechanical and chemical testing performed on the electrometric asphalt materials and supplies.
         2. The test shall be performed to certify compliance with CGSB 37 GP 56M standard.
   7. STORAGE, DELIVERY, HANDLING AND PROTECTION
      1. Comply with manufacturer's written instructions for handling, storing, and protecting during installation as well as any specific Consultant's instructions.
      2. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of items.
      3. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
      4. Remove any defective or improperly stored materials at Contractor's expense. Do not install defective materials.
      5. Do not store roofing materials in direct contact with the earth or paved surfaces. Place suitable supports under insulation upon delivery to protect it from absorbing dampness from the surrounding terrain or deck.
      6. Protect sheet metal materials from bending and scratching.
      7. All materials shall be adequately protected and permanently stored in a dry, well ventilated and weatherproof location. Only materials to be used the same day shall be removed from this location. During winter, materials shall be stored in a heated location with a 10 deg C. minimum temperature, remove only as needed for immediate use. Materials shall be kept away from open flame or welding sparks.
      8. Materials delivered in rolls shall be carefully stored on end, with selvage edges up. Metal flashing and counter flashing shall be stored in such a way as to prevent wrinkling, twisting, scratches and other damages.
      9. Avoid stockpiling of materials on roofs, which could, at certain places, affect the loading of such roofs.
      10. Do not store roof insulation in contract with the earth, road surface, or roof deck. Place suitable supports under the insulation upon delivery to protect it from absorbing dampness.
   8. site conditions
      1. Protect walls when hoisting is necessary. Locate kettles so that smoke and fumes will not discolour the building or adjacent buildings or become a nuisance to adjacent owners or the public.
      2. Protect roofs from damage due to traffic and material handling.
      3. Do not overload any area of roof.
      4. Provide portable fire extinguishers on the roof within easy access of torching applications.
   9. WARRANTies
      1. Special Warranty: Manufacturer's standard or modified form, total system, non-pro-rated, "No-Dollar-Limit," transferrable warranty in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks resulting from manufacturing and/or workmanship defects or deficiencies.
         1. Warranty Period: Twelve (12) years from date of Substantial Performance of the Work.
      2. Installer Warranty: Submit roofing Installer's warranty, on standard local roofing association "Standard Form of Warranty," signed by Installer, covering Work of this Section, including all components of membrane roofing system for the following warranty period:
         1. Warranty Period: Two (2) years from date of Substantial Performance of the Work.
      3. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.
         1. Notify warrantor of existing roofing system on completion of re-roofing and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.
2. Products
   1. MANUFACTURERS
      1. Basis of Design products are named in this Section; additional manufacturers offering similar setting systems may be incorporated into the work provided they meet the performance requirements established by the named products.
      2. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. IKO.
         2. Soprema Inc.
   2. AUXILIARY LEVELLING SURFACE
      1. Glass Mat Faced Roof Boards: Non structural, glass mat faced mould resistant gypsum panels having water resistant core; and as follows:
         1. Applicable Standard: ASTM C 1177 for manufacturing; ASTM D 3273 for mould resistance.
         2. Thickness: 13 mm.
         3. Surface Burning Characteristics: In accordance with CAN/ULC S102.
            1. Flame Spread: 0.
            2. Smoke Developed: 0.
         4. Long Edges: Square.
         5. Location: Roof substrates over steel decks and sheathing for parapets.
         6. Acceptable Materials:
            1. Georgia Pacific DensDeck Prime.
            2. CertainTeed GlasRoc Sheathing.
   3. FASTENERS
      1. Screw Fasteners: #14 Phillips preassembled mechanical fasteners fabricated from case hardened carbon steel with a rust preventive coating; 50 mm diameter, barbed stress plates that meet requirements of CSA B35.3 and FM 4470 approval standard and as follows:
         1. Fasteners will not be permitted in areas where acoustic steel deck is exposed in final interior construction; use insulation adhesive to prevent damage to finished surfaces.
         2. Space screws and stress plates one per 0.25 m2, penetrating a minimum of 38 mm into top of flutes for corrosion and wind lift factors.
      2. Roofing Nails: Spiral nails having 25 mm Ø steel round top cap 25 mm Ø and 3 mm Ø shank in accordance with membrane manufacturers recommendations, length to penetrate solid wood supports by a minimum of 38 mm and plywood substrates by a minimum of 19 mm.
   4. PRIMERS
      1. Primer for Self Adhered Membranes: Primer comprised of elastomeric bitumen and solvents, and adhesive enhancing resins as recommended by membrane roofing manufacturer to suit substrates and installation conditions.
   5. VAPOUR RETARDER
      1. Premanufactured Self-Adhering Air/Vapour Barrier: Self adhering air/vapour barrier membranes composed of bitumen modified with thermoplastic polymers and high-density polyethylene film; 1140 mm width to allow membrane to span top flute of structural steel deck, and having water vapour permeance of 0.92 ng/Pa·s·m2, and as follows:
         1. Acceptable Material:
            1. Henry Vapor Bloc SA.
            2. Soprema Sopravap'R.
   6. ROOF INSULATION
      1. Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
         1. Following types are acceptable:
            1. Polyisocyanurate Board Insulation: CAN/ULC-S704, Type 3 and ASTM C 1289, Type II, Class 2; closed cell polyisocyanurate foam manufactured using HC-, and HCFC-free blowing agents.
      2. Compressive strength: minimum 172 kPA (25 psi).
      3. Board Facer: Inorganic.
      4. Minimum RSI (R) Value: 1.0 per 25 mm (5.7 per 1") in accordance with CAN/ULC-S770 based on Long Term Thermal Resistance (LTTR) R-value.
      5. Thickness: As indicated on Drawings.
   7. TAPERED INSULATION
      1. Provide factory-tapered insulation boards fabricated to slopes indicated on Drawings. Tapered insulation to be of type compatible with roofing insulation for application indicated. Panels to be installed in accordance with shop drawings provided by the tapered insulation manufacturer.
      2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
      3. Material: Polyisocyanurate or Fibreboard.
   8. BASE SHEET MECHANICALLY FASTENED ROOF MEMBRANE SYSTEM
      1. Field Base Sheet Roofing Membrane: CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) modified bitumen prefabricated sheet.
         1. Classification: Type 2 - Covered Roofing, Class C - plain surfaced, Grade 2 - heavy duty service.
         2. Reinforcement: nonwoven polyester fibres to ASTM D 6164, having nominal weight of 180 g/m2.
         3. Top/bottom surfaces: Manufacturer's standard suitable for application indicated.
         4. Application: Mechanically Fastened.
      2. Basis-of-Design: "Fast-N-Stick 180-Base" by IKO or approved equivalent.
   9. CAP SHEET ROOFING MEMBRANE (TORCHED APPLICATION)
      1. Field Cap Sheet Roofing Membrane: CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) modified bitumen prefabricated sheet.
         1. Classification: Type 1 - Exposed roofing, Class A - Granule surface, Grade 2 - Heavy-duty.
         2. Reinforcement: Nonwoven polyester fibres to ASTM D 6164, having nominal weight of 250 g/m2.
         3. Top/Bottom Surfaces: Manufacturer's standard suitable for application indicated.
         4. Granule colour: As selected by Consultant from manufacturer's standard range.
         5. Application: Torched.
      2. Basis-of-Design: "TP-250-CAP" by IKO" by Johns Manville or approved equivalent.
   10. BASE SHEET FLASHING MEMBRANE
       1. Base Sheet Flashing Roofing Membrane: CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) modified bitumen prefabricated sheet.
          1. Classification: Type 2 - Covered Roofing, Class C - plain surfaced, Grade 2 - heavy duty service.
          2. Reinforcement: Nonwoven polyester fibres to ASTM D 6164, having nominal weight of 180 g/m2 or combination of polyester and glass fibres to ASTM D 6162, having nominal weight of 160 g/m2.
          3. Top/bottom surfaces: Manufacturer's standard suitable for application indicated.
       2. Application: Cold-applied/self-adhesive.
       3. Basis-of-Design: Armourbond Flash by IKO or approved equivalent.
   11. CAP SHEET FLASHING MEMBRANE
       1. Identical to field roofing cap sheet membrane.
   12. ROOF PAVERS, WALKWAYS AND BALLAST
       1. Roof Pavers:
          1. Provide pavers at all traffic concentration points (i.e., roof hatches, access doors, rooftop ladders, etc.), regardless of traffic frequency or whether or not these are explicitly indicated on Drawings.
          2. Concrete Roof Pavers: CSA A231.2, 30 MPa, precast concrete pavers, smooth faced.
             1. Size: 610 mm x 610 mm x 64 mm (24" x 24" x 2-1/2")
             2. Air entrainment: 4% to 6%,
             3. Edges: Chamfered.
             4. Finish: Non-slip finish.
          3. Paver Supports: Polystyrene: Extruded polystyrene insulation as specified herein fabricated with both sides having a matrix of drainage, size as required to support pavers.
             1. Grooves: 13 mm x 13 mm (1/2" x 1/2"); staggered.
   13. AUXILIARY MATERIALS
       1. Provide auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
       2. Primer: Manufacturer's recommended primers for application indicated and compatible with roofing components they come into contact with.
       3. Fasteners: Corrosion-Resistant, Factory-coated steel fasteners and metal or plastic plates conforming to FM 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
       4. Adhesives: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate with no solvents and specially formulated for compatibility with substrates and adjacent surfaces.
       5. Asphalt: Oxidized asphalt in conformance with CSA A 123.4 suited for application.
       6. Asphalt Primer: CGSB 37-GP-9Ma.
       7. Waterproofing Mastic: Mastic made of synthetic rubbers, plasticized with bitumen as recommended by manufacturer.
       8. Pourable Sealer: Two-part polyurethane pourable sealant designed for sealing penetration pockets as recommended by manufacturer.
       9. Pipe Flashings: Corrosion and weather resistant prefabricated pipe sleeves.
       10. Fire Stop Membrane: Self adhesive fire stop membrane composed of glass reinforcement and SBS modified bitumen.
           1. Fire stop membrane is a safety precaution and must be installed prior to the installation of any torch applied vapour barriers at substrate cracks and voids, angle changes at curbs, parapets, penetrations, or any locations subject to back drafts or entrance of flame from the torch, protecting combustible materials in the system.
   14. CARPENTRY
       1. Lumber identification by grade stamp of agency certified by the Canadian Lumber Standards Accreditation Board.
       2. Plywood identification by grade mark in accordance with applicable CSA standards.
       3. Lumber: unless specified otherwise, exterior-grade, and fire-retardant treated softwood, S4S, "Standard" or better grade, moisture content 19% or less in accordance with following standards:
          1. CAN/CSA O141.
          2. NLGA Standard Grading Rules for Canadian Lumber.
       4. Cant Strips: Cut from prefabricated torch-resistant material, to measure 100 mm (4") on slope.
       5. Nails: to CSA B111, Corrosion resistant nails and spikes (galvanized or better), suitable for the application.
   15. METAL FLASHINGS
       1. Design flashings troughs, scuppers, leader boxes, downspouts, gutters and similar flashing items with watertight seams. Allow for thermal expansion and contraction. Provide stiffeners to maintain profiles when fully filled with water. Provide smooth interior surfaces, free of sharp edges and protrusions.
       2. Underlay for Metal Flashing: CAN2-51.32-M, breather membrane.
       3. Sheet Metal: Commercial quality ASTM A 653/A 653M, Structural Steel Quality Grade 33 (230), galvanized steel, minimum, Z275 (G90) zinc coated.
          1. Thickness: 0.60 mm (24 ga) thick minimum.
          2. Finish (Concealed from view): Hot dip galvanized.
          3. Finish (Exposed to view): Pre-painted with Silicone modified polyester (SMP); colour as selected by Consultant.
       4. Cleats and Hook Strips: Same metal and thickness as metal flashings specified, unless indicated otherwise, make cleats at least 38 mm (1-1/2") wide and interlocked with metal flashing. Make starter strips continuous.
   16. ASSOCIATED ROOFING WORKS
       1. Provide all required associated roofing accessories and supports as necessary to provide complete roofing work and support roof equipment shown on Drawings. This includes but is not limited to supports for:
          1. Mechanical equipment, electrical equipment, pipes, guy wire, stack vents, relief vents, fall restraint anchors and similar components.
          2. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
          3. Provide seismically reinforced supports where required by Authorities Having Jurisdiction.
          4. Acceptable Manufacturers: Thaler Metal Industries Ltd. or approved equivalent.
3. Execution
   1. EXAMINATION
      1. Verify that substrates and conditions are in accordance with manufacturer's written recommendations and installation guidelines before starting Work of this Section.
      2. Start of roofing work will be interpreted as meaning roofing conditions are in accordance with manufacturer's requirements.
   2. preparation
      1. Protect finished work to avoid damage during roof installation and material transportation.
      2. Install protective boardwalks to enable passage of personnel and materials without causing damage to installed roofing materials.
      3. Mount mechanical application devices on pneumatic tired wheels; use devices designed and maintained to operate without damaging insulation, roofing membrane or structural components.
      4. Do not place flame heated equipment on roof; provide and maintain a fire extinguisher adjacent to flame heated equipment at ground level in close proximity to heated equipment.
      5. Operate open flame torches using experienced personnel specifically trained in the use of application equipment and fire prevention procedures.
   3. INSTALLATION
      1. Prepare surfaces and complete roofing work specified in this Section in accordance with manufacturer's written instructions and guidelines.
      2. Install roofing elements on clean and dry surfaces; in a continuous operation when substrates are ready and as weather conditions permit.
      3. Seal seams in base sheets that are not covered by a cap sheet membrane in the same day; do not install cap sheet if any moisture is present at or within base sheet seams.
      4. Protect Work of other Sections during installation of Work of this Section; repair or compensate other Sections for damage caused by this Section.
   4. LEVELLING BOARD INSTALLATION
      1. Fasten levelling board to upper flute surfaces of steel deck using a minimum of twelve (12) screws and washers for each 1220 mm x 2440 mm board; cut boards so that edges rest on centre of upper flutes using straight lines and sharp tools.
      2. Cut boards neatly where slopes change directions; do not break boards to conform to deck slopes; place boards perpendicular to deck flutes for continuous support at extremities.
   5. PRIMER INSTALLATION
      1. Apply primer to gypsum roofing substrates at a rate recommended by roofing membrane system manufacturer.
      2. Verify that surfaces being primed are free of rust, dust or any residue that reduces adhesion.
      3. Cover primed surfaces with roofing membrane within time limits recommended by roofing membrane system manufacturer.
   6. AIR/VAPOUR BARRIER INSTALLATION
      1. Install self adhering air/vapour barrier membrane by unrolling air/vapour barrier membrane onto substrate aligned with substrate materials starting at bottom of slope without removing silicone release sheet, and as follows:
         1. Align roll parallel to steel deck flutes supporting membrane overlaps on top of flute along entire length.
         2. Peel back one end of silicone release sheet and adhere membrane to substrate; peel remaining release sheet at a 45-degree angle to avoid wrinkles in membrane.
         3. Cut roll and start again where membrane is not properly aligned to deck flutes; realign membrane and overlap end of misaligned piece by 150 mm.
         4. Overlap adjacent membranes by 75 mm; overlap end laps by 150 mm; stagger end laps by 300 mm; place thin sheet of metal under end lap of membrane to provide structural support to lapped membranes.
      2. Overlap roof air/vapour barrier to wall air/vapour barrier using compatible continuity strip to provide continuity of building envelope.
      3. Install air/vapour barrier at insulation perimeters and around each element piercing insulation to provide sealed connections with base sheet at up stands.
   7. INSULATION INSTALLATION
      1. Mechanically attach insulation fastening into top flutes of steel deck in quantity and pattern in accordance with manufacturer's written recommendations.
      2. Install secondary insulation layer onto air/vapour barrier as the first layer, followed by installation of manufacturer's required primary flat insulation ready for installation of mechanically attached base membrane layer.
      3. Stagger vertical joints between primary insulation boards and secondary insulation modules and between two rows of insulation board.
      4. Install only as much insulation as can be covered by roof membranes in the same day.
   8. MECHANICALLY ATTACHED BASE SHEET INSTALLATION
      1. Unroll base sheet membrane on substrate, taking care to align the first strip with centre of drain, parallel to edge of roof; allow membrane to relax for a minimum of 15 minutes before starting mechanical installation; burn the plastic film in a zigzag fashion using a propane torch to relax it during cold weather installation.
      2. Fasten base sheet membrane at one end, pulling on membrane to stretch it flat; install recommended type and number of fasteners, working towards free end of roll; provide additional anchors at roof corners and edges, and around obstacles, lean tos, mechanical equipment and similar objects in accordance with manufacturer's written instructions.
      3. Adhere first 75 mm of the self adhering side laps using a roller, then heat weld the remaining 25 mm using propane torch; seal end joints by welding 150 mm wide protection band centred on joint.
      4. Provide a smooth application, free of wrinkles, fish mouths, air pockets or tears.
   9. BASE-SHEET FLASHING INSTALLATION
      1. Apply base sheet flashing when primer coat is dry and in accordance with manufacturer's written instructions.
      2. Position pre-cut membrane pieces; peel back 100 mm to 150 mm of silicone release paper to hold the membrane in place at the top of the parapet, then gradually peel back remaining silicone release paper, pressing down on the membrane with aluminium applicator to provide good adhesion and to provide smooth transition between up stand and field surface; smooth entire membrane surface with a roller for full adhesion.
      3. Cut off corners at end laps being covered by next roll.
      4. Install a reinforcing gusset in all inside and outside corners.
      5. Seal overlaps at the end of each workday.
   10. TORCH APPLIED CAP SHEET INSTALLATION
       1. Install cap sheet starting with double selvage starter roll in accordance with manufacturer's written instructions; unroll cap sheet at drain and align first side lap parallel to roof edge.
       2. Weld cap sheet onto base sheet using torch recommended by membrane manufacturer; simultaneously melt both contact surfaces so that a bead of bitumen is apparent as cap sheet unrolls during application.
       3. Stagger joints between base sheet and cap sheet a minimum of 300 mm.
       4. Overlap cap sheet side laps by 100 mm and end laps by 150 mm; cut off corners at end laps being covered by next roll; de granulate overlap surfaces.
       5. Weld cap sheet to base sheet leaving no voids and un welded areas; adjust welding time to obtain homogenous seam in cold weather in accordance with manufacturer's written installation requirements.
       6. Avoid excessive bitumen bleed out at joints.
   11. CAP SHEET FLASHING INSTALLATION
       1. Install cap sheet in 1000 mm wide strips with side joints overlapped by 100 mm and staggered 100 mm with respect to joints of cap sheet within field surface to avoid areas of excessive membrane thickness, and as follows:
          1. Overlaps on field surface must be 50 mm wider than those of base sheet membrane on up stands and parapets.
          2. Angle cut the corners that will be covered by the following roll at end laps.
       2. Use a chalk line to draw a straight line on the field surface 150 mm from the up stands and parapets.
       3. Use a propane torch and round nose trowel to embed surface granules in layer of hot bitumen starting from the chalk line on the field surface to the bottom edge of the up stand or parapet, and on granulated vertical surfaces that are being overlapped.
       4. Heat weld cap sheet directly to base sheet membrane starting from bottom to top; soften both membranes to obtain even, continuous weld between cap sheet and base sheet.
       5. Avoid excessive bitumen bleed out at joints.
   12. WATERPROOFING AT ROOF DRAINS
       1. Coordinate with Division 22 for installation of roof drains and sumps.
       2. Torch weld 1000 mm x 1000 mm membrane type as recommended by manufacturer in a diagonal position to base sheet and previously primed drain flange.
       3. Install cap sheet to edge of opening.
       4. Fasten dome to drain.
   13. FIELD QUALITY CONTROL
       1. Inspection and testing of roofing application will be carried out by testing laboratory designated by Owner in cooperation with the Consultant.

END OF SECTION