

SOPREMA ALSAN RS COLD LIQUID-APPLIED WATERPROOFING FULLY REINFORCED SYSTEM SPECIFICATION

PART 1 GENERAL

1.01 SYSTEM DESCRIPTION

- A. The following specification outlines the requirements for a fully reinforced, cold fluid-applied, (PMMA) methyl-methacrylate liquid resin waterproofing membrane (with optional approved broadcast mineral aggregate surfacing or approved coating) and all other ancillary waterproofing work including but not limited to, installation of drains, pipe flashings, penetration flashings, sealants and metal work as specified.
 - 1. All membrane materials shall have a superior coefficient of expansion, to allow for differential movement between the horizontal and vertical surface of the flashed penetration or projection.
 - 2. New membrane system MUST provide fast-drying primers to allow substrate preparation, priming and membrane application to be completed the same day.
 - 3. The use of cold fluid-applied reinforced (PMMA) methyl-methacrylate membrane materials will be required for all field membrane and flashings.
 - 4. Any occupied and/or heated spaces MUST be waterproofed using a fully reinforced system.

1.02 SECTION INCLUDES

- A. Adhered fully reinforced cold fluid-applied (PMMA) methyl-methacrylate liquid resin waterproofing system including, membrane, penetration flashings, base flashings, and expansion joints.
- B. Removal of all existing roofing/waterproofing materials
- C. Substrate preparation, cleaning, leveling and patching
- D. Temporary waterproofing and priming
- E. Waterproofing membrane installation
- F. Flashing installation and expansion joint installation
- G. Wearing/surfacing layer (optional)
- H. Overburden application (optional)

1.03 RELATED SECTIONS

- A. Supplementary General Conditions
- B. Basic Requirements
- C. Wood Blocking and Nailers
- D. Sheet Metal Flashing and Trim
- E. Overburden Installation

1.04 REFERENCES

- A. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
- B. ACI-308 - Recommended Practice for Curing Concrete
- C. ASTM - D638 - Test Methods for Tensile Properties of Plastics
- D. ASTM - D4258 - Standard Practice for Surface Cleaning Concrete for Coatings
- E. ASTM - D4259 - Standard Practice for Abrading Concrete

- F. ASTM - D4541 - Method for Pull-Off Strength of Coatings using Portable Adhesion Tester
- G. ASTM - E96(A) - Test Methods of Moisture Transmission of Material
- H. ASTM E-108, ANSI/UL 790 for fire resistance.
- I. International Concrete Repair Institute Guideline 03732 Concrete Surface Preparation
- J. Steel Structures Painting Council (SSPC)

1.05 SUBMITTALS FOR REVIEW

- A. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.
- B. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Owners Representative.
- C. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.
- D. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.
- E. Membrane Shop Drawings: Submit shop drawings of fully reinforced, cold fluid-applied, (PMMA) methyl-methacrylate liquid resin waterproofing membrane system showing all a project plan, size, flashing details, and attachment for review and approval by the Owners Representative and Membrane Manufacturer.

1.06 QUALITY ASSURANCE

- A. Membrane Manufacturer: Company specializing in manufacturing fully reinforced, cold fluid-applied liquid resin waterproofing membrane products as specified in this section with a minimum of five (5) years of documented applications in the United States. Membrane Manufacturer shall submit the following certifications for review:
 - 1. Substrates and conditions are acceptable for purpose of providing specified warranty.
 - 2. Materials supplied shall meet the specified requirements.
- B. Applicator: Company specializing in performing the work of this section with (3) years documented experience and approved by system manufacturer for warranted membrane installation. Applicator shall submit the following certification for review:
 - 1. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as an approved applicator for warranted installations.
- C. Evaluate moisture content of substrate materials. Constructor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.
- D. Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site by the performance of a manual pull test. Contractor shall perform tests at the beginning of the Work, and at intervals as required to assure specified adhesion with a minimum of three (3) tests per 5000 square feet. Smaller areas shall receive a minimum of three (3) tests. Test results shall be submitted to the Owner or his designated Representative and the Membrane Manufacturer. Contractor shall

immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event bond test results are below specified values.

1. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 219 psi (1.5 N/mm²) for pedestrian traffic and 300 psi (2.0 N/mm²) for vehicular (low speed) traffic and water flow/containment, as determined by use of an adhesion tester.
 2. Adequate surface preparation will be indicated by 135° peel bond strength of membrane to substrate such that cohesive failure of substrate occurs before adhesive failure of membrane/substrate interface.
 3. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
- E. Monitor quantities of installed materials. Monitor application of resin mixture, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable building and jurisdictional codes for roofing/waterproofing assembly and fire resistance requirements.
- B. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.
- C. Comply with authority or agency "Confined Space Policy" during and throughout all work to be performed.

1.08 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting at the job site (1) week before starting work of this section. Require attendance of parties directly affecting work of this section, including but not limited to, [Architect] [Engineer] [Roofing/Waterproofing Consultant], [Owner's Representative], Roofing/Waterproofing Contractor, and Membrane Manufacturer's Representative. Review roofing/waterproofing preparation and installation procedures, coordination and scheduling required with related work, and condition and structural loading limitations of deck/substrate.

1.09 FIELD INSPECTION SERVICES

- A. Manufacturer's technical representative shall provide the following inspections of the membrane application:
 1. Job start inspection at the beginning of each phase of the project, to review special detailing conditions and substrate preparation.
 2. Periodic in-progress inspections throughout duration of the project to evaluate membrane and flashing application.
 3. Final punch-list inspection at the completion of each phase of the project prior to installation of any surfacing or overburden materials.
 4. Warranty inspection to confirm completion of all punch list items, surfacing, and overburden application.

1.10 DELIVERY, STORAGE, AND PROTECTION

- A. The Contractor together with the Owner or his designated Representative shall define a storage area for all components. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer's recommendations and relevant regulatory agencies. Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.
- B. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.
- C. Roll goods shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends.
- D. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory should **not** be used as outside storage covers.
- E. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.
- F. Copies of all current MSDS for all components shall be kept on site. Provide any and all crew members with appropriate safety data information and training as it relates to the specific chemical compound he or she may be expected to deal with. Each crew member shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing/waterproofing membrane during or with the threat of inclement weather.
- B. Application of cold fluid-applied reinforced (PMMA) methyl-methacrylate roofing and waterproofing membrane may proceed while air temperature is between 23°F (-5°C) and 95°F (35°C) providing the substrate is a minimum of 5°F above the dew point.
- C. When ambient temperatures are at or expected to fall below 32°F (0°C), or reach 86°F (30°C) or higher, follow Membrane System Manufacturer's recommendations for weather related application procedures.
- D. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.
- E. Where required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Control/elimination measures shall be field tested at off-hours and typically consists of one (1) or a multiple of the following measures:
 - 1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air where required due to

size of intake opening. Provide track system to secure filters.

2. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire retardant materials in compliance with local code requirements in accordance with requirements of the Owner or his designated Representative. Equipment enclosure(s) with mechanical air intake/exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter.
3. Placement of odor elimination stations inside and outside of the enclosure(s) as required by field condition, in coordination with the Owner or his designated Representative.
4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.
5. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

1.12 COORDINATION & PROTECTION

- A. Coordinate the work with the installation of associated metal flashings, accessories, appurtenances, etc. as the work of this section proceeds.
- B. Building components shall be protected adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Contractor shall be responsible for preventing damage from any operation under its Contract. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.
- C. Provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or designated Representative.
- D. Protect finished roofing/waterproofing membrane from damage by other trades. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane.

1.13 WARRANTY

- A. Manufacturer's Standard Warranty: Provide twenty (20) year standard manufacturer's warranty under provisions of this section.
- B. Waterproofing Contractor's Warranty: Provide 2 year "Applicator Maintenance Warranty" covering workmanship for all work of this section including installation of membrane, flashings, metal work, and roofing/waterproofing accessories.
- C. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

1.14 MATERIAL SUBSTITUTIONS

- A. Materials proposed for use in the performance of the work that are not specified herein must

be submitted to the Owner/Owner's Representative for evaluation no later than ten days prior to bid.

PART 2 PRODUCTS

2.01 GENERAL

- A. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a pre-engineered system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed the physical performance characteristics of the specified materials. Unsaturated polyesters or single and two component urethane resin systems will not be accepted. A minimum Alsan RS fleece reinforcement is required.

2.02 FIELD MEMBRANE

- A. Field Membrane: Two-component, with catalyst, cold fluid-applied (PMMA) methyl-methacrylate waterproofing membrane reinforced with Alsan RS Fleece, for a finished nominal dry film membrane thickness of .080 inch per ply. Provide products manufactured and supplied by the following:
 - 1. Waterproofing Membrane: Soprema Alsan RS 230 Field resin for use in a fully adhered waterproofing membrane system.
- B. Physical Properties:

Property	Value	Test Method
Color	Pebble Gray	-
Physical state	(Liquid) Cures to solid	-
Nominal thickness (with Alsan RS Fleece)	80 mils	-
Tensile strength @ break	> 1200 psi	ASTM D-412
Elongation	> 62%	ASTM D-412
Tear resistance	>1100 lbf	ASTM D-624
Water vapor transmission	0.45 Perms	ASTM E-96
Water absorption	< 1%	ASTM D-570
Impact resistance	Shore A 85	ASTM D-2240
Usage time*	15-20 minutes	-
Rainproof after*	30 minutes	-
Solid to walk on after*	1 hour	-
Solid to drive on with air rubber tires after*	3 hours	-
Overburden may be applied after	3 hours	-
Completely hardened after	3 hours	-
Crack spanning	2mm/0.08 inch	-
Resistance to temperatures up to (short term)	250°C/482°F	-
*All times are approximate and depend upon wind, humidity and temperature.		

2.03 PRIMERS

- A. Epoxy Primer: Supplied by membrane manufacturer; two-component, high solids, and low-odor translucent epoxy primer for use in improving adhesion of membrane to substrate surfaces. Monitor application rate and adjust depending on substrate absorbency.
 - 1. Soprema Alsan EPR Primer for use on highly absorbent substrates.

- B. Methyl-Methacrylate Primer: Supplied by membrane manufacturer; two-component, high solids (PMMA) methyl-methacrylate resin for use in improving adhesion of membrane to various substrate surfaces. Monitor application rate and adjust depending on substrate absorbency.
 - 1. Soprema Alsan RS 222 Primer for use over bituminous surfaces in fully adhered waterproofing membrane system.
 - 2. Soprema Alsan RS 276 Primer for use over concrete and wood surfaces in fully adhered waterproofing membrane system.

2.04 FLASHING MEMBRANE

- A. Flashing Membrane: A vertical grade two-component, with catalyst, cold fluid-applied (PMMA) methyl-methacrylate waterproofing membrane reinforced with Alsan RS Fleece, for a finished nominal dry film membrane thickness of .080 inch per ply with optional finished colored aggregate topcoat surfacing or approved coating.
 - 1. Soprema Alsan RS 230 Flash resin for use in a fully adhered waterproofing membrane system.

2.05 OTHER RESINS

- A. Wearing/Surfacing Resin: Three-component, with catalyst, cold fluid-applied (PMMA) methyl-methacrylate self-leveling mortar.
 - 1. Soprema Alsan RS 233 Self-Leveling Mortar (Alsan RS 210 resin mixed with Alsan RS 223 Powder) for use in trafficable waterproofing membrane systems.
- B. Patching, Filling and Smoothing Resin: Two-component, with catalyst, cold fluid-applied (PMMA) methyl-methacrylate paste.
 - 1. Soprema Alsan RS Paste for use in filling small cracks, voids and depressions and for smoothing membrane laps prior to application of Alsan RS resins.
 - 2. Soprema Alsan RS Detailer (micro-fiber enhanced PMMA) for use in flashing small and difficult penetrations and for filling small cracks, voids and depressions where use of Alsan RS reinforced membrane is not possible. Use of material must be approved by manufacturer in writing.
- C. Textured Surfacing: Two-component, with catalyst, cold fluid-applied (PMMA) methyl methacrylate resin, with pre-mixed grain, trafficable surface finish.
 - 1. Soprema Alsan RS Textured Coating for use as a heavy duty vehicular trafficable surface finish in reinforced and non-reinforced systems.
 - 2. Soprema Alsan RS 290 Textured Finish for use as a pedestrian or vehicular trafficable surface finish in reinforced and non-reinforced systems.
- D. Finish Resin: Two-component, with catalyst, cold fluid-applied (PMMA) methyl-methacrylate aesthetic finish layer.
 - 1. Soprema Alsan RS 288 Finish for use as a colored finish layer, colored finish layer with Alsan RS Deco Chips broadcasted and as a sealing layer when natural Alsan RS Surfacing Aggregate is used.

2. Soprema Alsan RS 281 Finish for use as a translucent (clear) finish layer over colored Alsan RS Surfacing Aggregate, vinyl chips or other approved aesthetic materials.

2.06 REINFORCEMENT

- A. Reinforcing Fleece: Non-woven, needle-punched polyester fabric reinforcement used in the Alsan RS system.
 1. Soprema Alsan RS Fleece used to improve tear strength, puncture resistance, flexural fatigue and crack bridging capabilities while maintaining membrane uniformity.
 - a. Color: White
 - b. Nominal thickness: 40 mils
 - c. Weight: 110 g/m²
 - d. Tensile Strength @ break (N/50mm): ≥ 130 MD / 150 CMD
 - e. Elongation (%): ≥ 50 MD / 70 CMD
 - e. Tear Resistance: 20>daN
 - f. Puncture Resistance: 24>daN
 - g. Water absorption (%): <1

2.07 ACCESSORIES

- A. Tools, Accessories, and Cleaners: Supplied and/or approved by membrane manufacturer for product installation.
- B. Alsan RS Surfacing Aggregate:
 1. Topcoat Slip-Resistant Surfacing Aggregate: Silica sand, ceramic-coated quartz, or specialty aggregate shall be washed, kiln-dried, and dust-free with the following size specification:
 - a. Aesthetic: 0.4 - 0.8 mm
 - b. Bond/Wearing Coat: 1.0 - 1.6 mm
 - c. Pedestrian Traffic: 0.4 - 0.8 mm
 - d. Light Vehicular Traffic: 0.7 - 1.2 mm
 - e. Soprema Alsan RS Deco Chips 1/16" + (1.6 mm +)
 2. Leveling and Patching Aggregate: silica sand shall be washed, kiln-dried, and dust-free, suitable for troweling or pourable self-leveling, round grain or angular with the following size specification:
 - a. For voids less than 1/4" in depth: 0.4 - 0.8 mm
 - b. For voids 1/4" to 2" in depth: 0.7 - 1.2 mm
 - c. Mixing Proportions shall be a ratio of primer to sand at 1:3 by volume or as approved by membrane manufacturer.
- C. Backer Rod: Expanded, closed-cell polyethylene foam designed for use with cold-applied joint sealant.
- D. Caulking: Single component, non-sag elastomeric polyurethane sealant, as recommended and supplied by membrane manufacturer for use in making airtight and watertight seals where required.
- E. Wood Nailers and Cant Strips: New wood nailers and cant strips shall be pressure treated for rot resistance (e.g., "Wolmanized" or "Osiose K-33"), #2 or better lumber. Asphaltic or creosote treated lumber is **not** acceptable.

- F. Miscellaneous Fasteners: Appropriate for purpose intended and approved by fastener manufacturer; length required for thickness of material [with metal washers]; as supplied and approved by membrane manufacturer.
- G. Drains: Spun/cast aluminum or cast iron roof drain with strainer/grate, as supplied or approved by membrane manufacturer.
- H. Temporary and Night Sealant: As recommended or required by membrane manufacturer.
- I. Filter Fabric: Non-woven polyester fabric, minimum 4.0 oz/sq.yd. for use under stone ballast, sand setting bed, and similar overburden; as supplied or approved by membrane manufacturer.
- J. Alsan RS Catalyst Powder: White granular powder, based on dibenzoylperoxide, used as a reactive agent to induce curing of all Alsan RS resins.
- K. Alsan RS Liquid Thixo: Thixotropic liquid additive used to increase viscosity of Alsan RS resins.
- L. Drainage Board: Two part prefabricated drainage material and protection board consisting of a formed polystyrene core covered on one side with a non-woven needle-punched polypropylene filter fabric.
 - 1. Sopra-Drain 500
 - 2. Sopra-Drain 650
 - 3. Sopranature-Drain
- M. Capillary Mat: Laminated mat of 6-mil black UV polyethylene film, root barrier, integrated irrigation system and a non-woven geotextile for water filtering, retention and distribution.
 - 1. Aquamat Jardin
- N. Pavers: Standard concrete pavers with compressive strength greater than or equal to 7000 psi, water absorption not greater than 5% and meeting ASTM C-67 for freeze/thaw cycles as recommended by manufacturer.
- O. Supportive Pedestals: Pedestals to support and space pavers with leveling shims or similar method to adjust paver height as recommended by manufacturer.
- P. Stone Ballast: Acceptable stone ballast as approved or supplied by membrane manufacturer
- Q. Insulation Adhesive: Two component elastomeric high velocity urethane insulation adhesive.
 - 1. Soprema High Velocity Insulation Adhesive III

2.08 INSULATION COVER BOARD

- A. Cover Board (Sopraboard): High compressive strength, multi-ply, semi-rigid asphaltic roofing substrate underlayment board composed of a mineral fortified asphaltic core formed between two asphaltic saturated fiberglass liners, with the following characteristics:
 - 1. Board Weight 0.9 lb/sq. ft [1/8] inch, 1.7 lb/sq. ft [1/4] inch
 - 2. Board Size [48 x 48] [48 x 60] [48 x 96] inches
 - 3. Board Thickness 1/8 inch, 1/4 inch
 - 4. Compressive Strength 630 psi [1/8] inch, 440 psi [1/4] inch as determined @ 15%

- | | | |
|----|-------------|----------------------|
| 5. | Board Edges | ASTM D 545
square |
|----|-------------|----------------------|
- B. Cover Board (Durock): High compressive strength underlayment board consisting of aggregated Portland cement slurry with polymer-coated glass-fiber mesh, with the following characteristics:
- | | | |
|----|----------------------|---|
| 1. | Board Weight | 3.0 lb/sq. ft |
| 2. | Board Size | [48 x 48] [48 x 96] inches |
| 3. | Board Thickness | 1/2 inch |
| 4. | Thermal Conductivity | K factor of 1.92 as determined by ASTM C177 |
| 5. | Board Edges | square |
- C. Cover Board (Plywood): APA-rated C-C Plugged exterior-grade plywood board, installed plugged side up, with the following characteristics:
- | | | |
|----|----------------------|---|
| 1. | Board Weight | 1.4 lb/sq. ft |
| 2. | Board Size | [48 x 48] [48 x 96] inches |
| 3. | Board Thickness | 1/2 inch |
| 4. | Thermal Conductivity | K factor of 0.80 as determined by ASTM C177 |
| 5. | Board Edges | square |

2.09 INSULATION

- A. Insulation: Soprema's polyisocyanurate insulation board having non-asphaltic facers meeting or exceeding the requirements for Fed. Spec. HH-I-1972/Gen. with minimum compressive resistance of 18 [redacted] psi, 1.0 inch minimum thickness, with the following characteristics:
- | | | |
|----|----------------------|--|
| 1. | Board Density | 2.0 lb/cu ft |
| 2. | Board Size | [48x48][48 x 96] inches |
| 3. | Board Thickness | [redacted] inches |
| 4. | Thermal Conductivity | K factor of [0.17] [redacted] as determined by ASTM C177, aged 12 months at 75 degrees F |
| 5. | Board Edges | square |
- B. Insulation: Extruded polystyrene insulation board as approved by manufacturer with the following characteristics:
1. Insulation to meet ASTM C-578, Types VI or VII.
 2. Minimum compressive strength per ASTM D-1621; 40 or 60 psi.
 3. Maximum water absorption per ASTM C-272; 0.1%
 4. Water vapor permeance for 1" product per ASTM E-96; 1.0 perms.
 5. Insulation to have an R value of 5.0 ft² h/Btu/in. per ASTM C-518.
 6. Board edges to be square.
 7. Insulation shall be free of CFC's.

2.10 TAPERED INSULATION

- A. Insulation: Tapered polyisocyanurate insulation board having non-asphaltic facers meeting or exceeding the requirements for Fed. Spec. HH-I-1972/Gen. with minimum compressive resistance of 18 [redacted] psi, 1.0 inch minimum thickness, with the following characteristics:
- | | | |
|----|---------------|-------------------------|
| 1. | Board Density | 2.0 lb/cu ft |
| 2. | Board Size | [48x48][48 x 96] inches |

3. Board Taper [] inch per foot
4. Total Thickness [] inches minimum [As required to achieve an average R value of [] for tapered insulation system].
5. Thermal Conductivity K factor of [0.17] [] as determined by ASTM C177, aged 12 months at 75 degrees F
6. Board Edges square

2.11 MODIFIED BITUMEN BASE SHEET

- A. Colvent: Torch or self-adhered modified bitumen vented base sheets.
- B. Elastophene: Torch or self-adhered modified bitumen base sheets.
- C. Sopralene: Torch or self-adhered modified bitumen base sheets.

2.12 MODIFIED BITUMEN PRIMER

- A. Elastocol 500 asphaltic primer.
- B. Elastocol 600c asphaltic primer.

2.13 BASE/CAP SHEET AND INSULATION SECUREMENT

- A. Mechanical Fasteners: FM-approved corrosion resistant insulation/base sheet fasteners of appropriate length with plates. Securement pattern shall be in accordance with specified wind uplift rating for system application. Roofing fasteners shall be a type approved and supplied by membrane manufacturer.
- B. Polyurethane Adhesive: FM-approved High Velocity, moisture-cured polyurethane adhesive. Adhesive application rate shall be in accordance with specified wind uplift rating for system application. Roofing adhesive shall be a type approved and supplied by membrane manufacturer. Note: prior written approval by the adhesive, insulation and membrane type for use of polyurethane roofing adhesive must be obtained from membrane manufacturer.
- C. Asphalt Adhesive: FM-approved steep roofing asphalt conforming to ASTM D-312, Type III. Provide label on each container indicating flash point, finished blowing temperature, softening point, and equiviscous temperature. Asphalt primer, cutback solvent type, conforming to ASTM D-41, required for concrete, masonry, and metal surfaces.

2.14 WEARING AND SURFACING

- A. Aesthetic Color Finish Coating: Two-component rapid curing (PMMA) methyl-methacrylate based coating suitable for use as a colored coating for exposed and submerged applications, as provided by the following Manufacturer:
 1. Soprema Alsan RS 288 Finish color resin.
 2. Soprema Alsan RS Deco Chips.
- B. Aggregate Light Pedestrian Slip-Resistant Finish Surfacing: Two-component rapid curing (PMMA) methyl-methacrylate based resin suitable for use to both bond and seal aggregate, as provided by the following Manufacturer:
 1. Soprema kiln-dried silica quartz aggregate.
 2. Soprema ceramic colored quartz aggregate.
 3. Soprema Alsan RS 288 Finish color resin.

4. Soprema Alsan RS 281 Finish translucent resin.
 5. Soprema Alsan RS Deco Chips.
 6. Soprema Alsan RS 290 Textured Finish.
- C. Wearing Layer with Slip-Resistant Finish Surfacing: Two-component rapid curing (PMMA) methyl-methacrylate based resins suitable for smoothing and leveling out the membrane overlaps and unevenness to create flat surface and for use to both bond and seal aggregate, as provided by the following Manufacturer:
1. Soprema Alsan RS 233 Self-Leveling Mortar resin.
 2. Soprema kiln-dried silica quartz aggregate.
 3. Soprema ceramic colored quartz aggregate.
 4. Soprema Alsan RS 288 Finish color resin.
 5. Soprema Alsan RS 281 Finish translucent resin.
 6. Soprema Alsan RS Deco Chips.
 7. Soprema Alsan RS Textured Coating.
 8. Soprema Alsan RS 290 Textured Finish.
- D. Bonding Layer: Two-component rapid curing (PMMA) methyl-methacrylate based resins suitable for creating a flat surface for use to bond aggregate to hold tile mortar, top concrete wearing layer or similar materials as provided or approved by the following Manufacturer:
1. Soprema's system Alsan RS 230 Field and/or Flash resins (bond/wearing coat).
 2. Soprema's system kiln-dried #2 (1.0 – 1.6 mm) silica quartz aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck/substrate openings, curbs, and protrusions through deck/substrate, wood cant strips and reglets are in place and solidly set.
- C. Verify deck/substrate is structurally supported, secure and sound.

3.02 PREPARATION OF SUBSTRATE

- A. General: All existing roofing and waterproofing materials are to be removed down to the structural deck.
- B. Surfaces to be prepared as a substrate for the new waterproofing system as follows:
 1. The contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.
 2. Prepare flashing substrates as required for application of new waterproofing membrane flashings.
 3. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.
 4. Remove all ponded water, snow, frost and/or ice from the work substrate prior to

installing new waterproofing materials.

5. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.

C. Concrete:

1. New concrete shall have cured a minimum of 28 days in accordance with ACI-308, or as approved by Waterproofing Manufacturer's Technical Department.
2. New or existing concrete shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, bituminous products and previous waterproofing materials.
3. New or existing concrete shall be dry with a maximum moisture content of six (6) percent and ninety-six (96) percent relative humidity. Determinations of moisture content shall be performed by the Contractor. Contractor shall be responsible to perform periodic evaluations of moisture content during the work. Moisture evaluation results shall be submitted in writing to the Owner or his designated Representative and Waterproofing manufacturer for acceptance.
4. Where required, concrete shall be abrasively cleaned in accordance with ASTM D4259 to provide a sound substrate free from laitance. Achieve an open concrete surface in accordance with ICRI surface profiles CSP 3-5. When using mechanical methods to remove existing waterproofing products or surface deterioration, the surface profile is not to exceed ¼ inch (peak to valley).
5. The substrate shall be sound and all spalls, voids and blow holes on vertical or horizontal surfaces must be repaired prior to placement of the primer coat. Ensure all uneven areas are leveled using cementitious or other suitable materials. Repairs are to be done in accordance with the requirements of the Owner or his designated Representative and approved by the Membrane manufacturer.
6. Areas of minor surface deterioration of 0.25" (6 mm) or greater in depth shall be repaired to prevent possible ponding of the system, leading to excessive usage of primer and resin.
7. Extent and location of thin surface patching shall require approval of the Owner or his designated Representative and Waterproofing Manufacturer prior to the application of any system component.
8. For concrete materials with a compressive strength of less than 3,500 psi contact Waterproofing Manufacturer's Technical Department for substrate preparation requirements.
9. As an option to applying the Alsan RS system directly to concrete, adhere a Soprema modified bitumen base sheet to the properly primed substrate. Contact Membrane Manufacturer for written approval prior to installing it. Approved SBS modified bitumen membrane not allowed in balcony, terrace and parking deck applications without the use of approved overburden.

D. Masonry:

1. Walls shall be built with hard kiln dried brick or waterproof concrete block construction.

2. Areas of soft or scaling brick or concrete, faulty mortar joints, or walls with broken, damaged or leaking coping shall be repaired in accordance with the requirements of the Owner or his designated Representative and Flashing Membrane Manufacturer.

E. Steel/Metal:

1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three (3) inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop.
2. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

F. Wood/Plywood:

1. Plywood shall be identified with American Plywood Association (APA) grade trade marks and shall meet the requirements of product standard PS1. Strip plywood joints with four inch (4") wide strip of flashing membrane. Cover knot holes or cracks with strips of flashing Membrane.

G. Other Flashing Surfaces:

1. Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Owner or his designated Representative.

H. Finish Leveling, Patching and Crack Preparation:

1. General: Resin/sand mix is the preferred material for all substrate finish leveling, crack and wall/deck preparation and patching. Resin/sand patching mix provides a fast-set time of approximately 45 minutes and does not require surface grinding.
2. Primer/sand mix is an alternative substrate leveling and patching material over horizontal surfaces. Primer/sand patching mix provides a set time of approximately 1 hour, and does not require surface grinding. Primer/sand mix is typically applied in conjunction with general surface priming.
3. Substrate Leveling & Patching: Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and Membrane manufacturer. Perform leveling and patching operations as follows:
 - a) Level uneven horizontal and low-slope surfaces with a leveling mixture of (PMMA) methyl-methacrylate Alsan RS 233 Self-Leveling Mortar [depth < ½", (12mm)] resin. Depths < ½" should be build up in separate layers. Spread and plane this resin with a squeegee, trowel and/or roller to achieve a flat surface. Spike roller may be used to smooth out the surfaces.
 - b) Fill cavities on horizontal and low-slope surfaces with a patching mixture of (PMMA) methyl-methacrylate primer and approved kiln-dried sand in a 1:3 primer to sand ratio by volume or with (PMMA) methyl-methacrylate Alsan RS Paste using trowels to apply the resin mortar in place and achieve flat surface.
 - c) Fill cavities on sloped and vertical surfaces with (PMMA) methyl-methacrylate Alsan RS Paste using trowels to apply the resin mortar in place and achieve flat surface.

- d) Silica sand must be kept absolutely dry during storage and handling.
 - e) Any surface to be leveled or filled must first be primed with an appropriate (PMMA) methyl-methacrylate primer and all Alsan RS resin mortars shall be placed in lifts no greater than the maximum thickness indicated by the manufacturer.
4. Joint and Crack Preparation: Joints, cracks and fractures in the structural deck/substrate shall be prepared as defined below prior to installation of the waterproofing membrane. Note: Joints, cracks, and fractures may telegraph through the waterproofing membrane.
- a) Non-Moving Cracks: Determine that crack is non-moving. Clean out crack by brushing and oil-free compressed air. Fill crack with (PMMA) methyl-methacrylate Alsan RS Paste. Allow for a minimum of one (1) hour cure or as required by product manufacturer.
 - b) Moving Cracks: Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with (PMMA) methyl-methacrylate Alsan RS Paste. Allow for a minimum of one (1) hour cure or as required by product manufacturer. Apply resin and 4 inch (10 cm) wide strip of membrane (resin and fleece) in strict accordance with Membrane manufacturer's written instructions.

3.03 WOOD NAILER LOCATION AND INSTALLATION

- A. Install pressure-treated wood nailers as specified, or as required by the Membrane manufacturer.
- B. Secure Wood Nailer: Wood nailers shall be firmly fastened to the deck. The wood nailer attachment must be able to resist a minimum force of 200 lbs. per lineal foot, in any direction. Mechanically fasten wood nailers as required to resist a force of 200 lbs per lineal foot, but with no less than 5 fasteners per 8 foot or 6 fasteners per 10 foot length of nailer. Refer to current FM Loss Prevention Bulletin 1-49 for additional attachment recommendations.

3.04 MODIFIED BASE SHEET APPLICATION (Optional)

- A. As an option to the application of the Alsan RS system directly to concrete or existing membrane surfaces, a modified bitumen base sheet may be adhered to the substrate before application of the liquid system. Use of a modified base sheet must be approved by manufacturer in writing. Prime surfaces to receive the base sheet with Elastocol 500 or 600c @ 100-125 ft²/gal and allow to cure.
- B. Torch or self-adhere the specified modified bitumen base sheet to the primed deck. Side laps to be a minimum of 3" and end laps a minimum of 6". If a venting base sheet is used, ensure that rolls are properly aligned and installed to allow moisture movement. Consult manufacturer for all requirements and proper installation techniques.

3.05 INSULATION/COVER BOARD INSTALLATION

- A. General: Insulation and cover board shall be installed in accordance with the insulation/cover board manufacturer's current published specifications and recommendations for use with adhered roofing.

Note: An increased amount of roofing adhesive and/or fasteners may be required at the perimeter band of the roof, depending upon parapet and building height. Refer to the Roof

Membrane Manufacturer Application Rate Chart for recommended application rates.

- B. Install Insulation/Cover Board: Install only as much insulation and cover board as can be primed, sealed, and protected before the end of the day's work or before the onset of inclement weather.
- C. Fit Insulation/Cover Board: Neatly fit insulation/cover board to all penetrations, projections, and nailers. Insulation shall be loosely butted, with gaps not greater than 1/4". All gaps greater than 1/4" shall be filled with acceptable insulation. Cover board shall be loosely butted, with gaps not greater than 1/4". All gaps lesser than 1/8" shall be filled with primer; all gaps greater than 1/4" shall be filled with (PMMA) methyl-methacrylate Alsan RS Paste.
- D. Strip In Cover Board Joints: Strip all cover board joints with four inch (4") wide strip of flashing membrane. Under no circumstances shall the membrane be left unsupported over a space greater than 1/4".
- E. Stagger Insulation/Cover Board Joints: When installing multiple layers of insulation, all joints between succeeding layers shall be staggered a minimum of 6" in each direction.
- F. Steel Deck Substrates: Place boards perpendicular to steel deck flutes with edges over flute surface for bearing support. Edges shall be checked so that no edges are left substantially unsupported along the flutes.
- G. Drain Sumps: Insulation shall be feathered or tapered to provide a sump area a minimum of 36" x 36" where possible at all drains. Taper insulation around roof drains so as to provide proper slope for drainage. In areas where feathered or tapered insulation leaves insulation core exposed, cover with an appropriate cover board or base sheet/cap sheet assembly to provide a sound and smooth substrate surface.
- H. Tapered Insulation: Place the constant thickness first layer and the tapered thickness insulation to the required slope pattern in accordance with insulation manufacturer's instructions.
- I. Mechanical Attachment: Follow insulation/cover board and fastener manufacturers' recommendations for the appropriate fastener and plate type, size and length. Reference FM approvals for fastening patterns that satisfy FM wind uplift requirements. Typical application is one fastener and plate per 2 square feet of insulation/cover board to be attached. Note: additional fasteners are required in the corner and perimeter regions of the roof. Secure insulation/cover board in accordance with approval requirements.
- J. Polyurethane Adhesive Attachment: Follow manufacturers' recommendations for the appropriate adhesive application rate and procedures. Under normal application rate, dispense the first bead 3" inside the outside edges of the insulation/cover board to be attached, with sequential beads equidistant. Place the boards onto the roofing adhesive beads. Walk on the boards to spread the roofing adhesive for maximum contact. Periodically walk on the boards until firmly attached. Reference FM approvals for adhesive application patterns that satisfy FM wind uplift requirements. Typical application is a 3/4" bead of roofing adhesive at a rate of one lineal foot per square foot of insulation/cover board to be attached.

Note: additional adhesive is required in the corner and perimeter regions of the roof. Secure insulation/cover board in accordance with approval requirements.
- K. Asphalt Adhesive Attachment: Follow insulation manufacturer's recommendations for the appropriate asphalt application rate and application procedure. Set each insulation panel layer in a full mopping of hot steep asphalt (Type III) at the recommended EVT range. Walk on the boards to spread the roofing adhesive for maximum contact. Periodically walk on the

insulation boards until firmly attached. Reference FM approvals for asphalt application rates that satisfy FM wind uplift requirements. Typical application is 25 lbs. per 100 square feet of insulation board to be attached. Secure insulation in accordance with approval requirements.

3.06 PRIMER APPLICATION

A. General:

1. Mix and apply two-component (PMMA) methyl-methacrylate primer and epoxy primer in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary materials, as supplied by the membrane manufacturer.
2. The substrate surface must be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.
3. Do not install primer on any substrate containing newly applied and/or active asphalt, coal-tar pitch, creosote or penta-based materials unless approved in writing by Membrane Manufacturer. Some substrates may require additional preparation before applying primer.

B. Mixing of Standard Two-Component (PMMA) Methyl-Methacrylate Primers:

1. Premix primer thoroughly with a spiral agitator or stir stick. Add pre-measured catalyst amount into mixed primer container and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The primer solution should be a uniform color, with no light or dark streaks present.
2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
3. Mix only that amount of primer that can be used within 15 minutes.

C. Mixing of Standard Two-Component Epoxy Primer:

1. Mix A and B components together with a spiral agitator or stir stick. Use slow speed. DO NOT AERATE. The primer solution should be a uniform color, with no light or dark streaks present.
2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
3. Mix only that amount of primer that can be used within 15 minutes.

D. Application of Primers:

1. Apply PMMA primer at the minimum rate of approximately 0.037 kg/sf (0.4 kg/m²). Apply epoxy primer at the minimum rate of approximately 0.028 kg/sf (0.3 kg/m²)
2. Roll or brush the primer evenly onto the surface to fully saturate the substrate in one application. Do not allow primer to pond or collect in low areas.

3. Apply primer only up to the edge of the membrane flashing terminations. Primer application past the membrane terminations requires surfacing with an approved material.
4. For (PMMA) methyl-methacrylate primer applications over cementitious substrates where protection from substrate wetness is required, apply primer coat at a heavier application rate until pore saturation is achieved.
5. For all Alsan EPR primer applications, apply kiln-dried sand into the final coat of Alsan EPR primer while still wet at the rate of 30 lbs. per 100 square feet (1.5 kg/m²). Use quartz size # 0 (0.4 – 0.8 mm).
6. Allow standard (PMMA) methyl-methacrylate primers to cure for a minimum of thirty (30) minutes before membrane application. Allow epoxy-based quick-dry primers to cure for a minimum of one (1) hour before membrane application. Membrane must be applied to primer only when completely dry and without tack.
7. Premature exposure to moisture may require removal and application of new primer. DO NOT apply new primer over exposed primer older than six (6) months, primer prematurely exposed to moisture, or primer used as temporary waterproofing, unless approved in writing by the Membrane Manufacturer.

E. Disposal of Primer:

1. Cured primer may be disposed of in standard landfills. This is accomplished by thoroughly mixing with catalyst powder.
2. Uncured primer is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not through uncured resin away.

3.07 LIQUID MEMBRANE APPLICATION

A. General:

1. Mix and apply cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary membrane resins and materials, as supplied by the membrane manufacturer.
2. The primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.
3. Two-part (PMMA) methyl-methacrylate resins cure most quickly and completely when exposed to UV light. For concealed and/or interior applications where exposure to natural UV light cannot be obtained, exposure to a UV light source or a supplemental source of hot air blown over the membrane surface will improve membrane cure.
4. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before three (3) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.
5. Closely follow the Membrane Manufacturer's recommendation for hot and cold weather application. Monitor surface and ambient temperatures, including the effects of wind

chill.

B. Mixing of Resin:

1. Mix resin with a spiral agitator for a minimum of 2 minutes until the liquid has a uniform color.
2. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.

C. Application of Resin/Fleece

1. Apply mixed resin to the prepared surface at the approximate rate of 0.19 kg/sf (2.0 kg/m²). The resin should be rolled or brushed liberally and evenly onto the surface using a broad, even stroke. Cover one working area at a time, between 15 – 20 ft.² (1.4 – 1.9 m²).
2. Roll out dry polyester fleece onto the liquid resin mix, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use a medium nap roller or brush to work the resin into the fleece, saturating from the bottom up, and eliminating air bubbles, wrinkles, etc. The appearance of the saturated fleece should be light opaque amber with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.
3. Apply additional liquid resin mix on top of fleece at the approximate rate of 0.12 kg/sf (1.3 kg/m²) to finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece, eliminating ponding or excessive build-up of the resin. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of resin will leave no whiteness in fleece and there will be a slightly fibrous surface texture. The final resin coating should be smooth and uniform.
4. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag.
5. At all fleece seams, allow a 2" (5 cm) overlap for all side joints and a 4" (10 cm) overlap for all end joints.
6. At membrane tie-offs, clean in-place membrane with Alsan RS Cleaner once resin has cured. Allow cleaner to fully evaporate before application of new resin.
7. Alsan RS 230 Field resin is alkalinity resistant. Additional bond/wearing layer consisting of one application of Alsan RS 230 Field on horizontal surfaces and one application of approved broadcast mineral aggregate surfacing shall be applied wherever stone, concrete, or masonry elements will be placed directly over the flashing.

D. Disposal of Resin:

1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing resins with Catalyst Powder.

2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.

3.08 FLASHING APPLICATION

A. General:

1. Install cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing flashing system in accordance with the requirements/recommendations of the Membrane manufacturer and as depicted on standard drawings and details. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.
2. Wherever possible, install the flashings before installing the field membrane to minimize foot traffic over newly installed field membrane.
3. All membrane flashings shall be installed concurrently with the waterproofing membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Membrane manufacturer. Should any water penetrate the new waterproofing membrane because of incomplete flashings, the affected area shall be removed and replaced at the contractor's expense.
4. Provide a minimum vertical height of 8" for all flashing terminations. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.
5. All flashings shall be terminated as required by the Membrane Manufacturer.
6. Alsan RS 230 Flash resin is alkalinity resistant. Additional bond/wearing layer consisting of one application of Alsan RS 230 Flash on vertical surfaces and one application of approved broadcast mineral aggregate surfacing shall be applied wherever stone, concrete, or masonry elements will be placed directly over the flashing.

B. Mixing of Resin:

1. Mix resin with a spiral agitator for a minimum of 2 minutes until the liquid has a uniform color.
2. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.

C. Application of Resin/Fleece

1. Apply mixed resin to the prepared surface at the approximate rate of 0.19 kg/sf (2.0 kg/m²). The resin should be rolled or brushed liberally and evenly onto the surface using a broad, even stroke. Cover one working area at a time, between 2 – 5 ft.² (0.19 – 0.46 m²).
2. Roll out dry polyester fleece onto the liquid resin mix, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use a medium nap roller

or brush to work the resin into the fleece, saturating from the bottom up, ensuring that all angle changes points are tight and not bridged and eliminating air bubbles, wrinkles, etc. The appearance of the saturated fleece should be light opaque amber with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.

3. Apply additional liquid resin mix on top of fleece at the approximate rate of 0.12 kg/sf (1.3 kg/m²) to finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece, eliminating ponding or excessive build-up of the resin. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of resin will leave no whiteness in fleece and there will be a slightly fibrous surface texture. The final resin coating should be smooth and uniform.
4. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag.
5. At all fleece seams, allow a 2" (5 cm) overlap for all side joints and a 4" (10 cm) overlap for all inside and outside corner overlaps.
6. At membrane tie-offs, clean in-place membrane with Alsan RS Cleaner once resin has cured. Allow cleaner to fully evaporate before application of new resin.

D. Disposal of Resin:

1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing resins with Catalyst Powder.
2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.

E. Metal Flashing – General:

1. Metal flashings shall be fabricated in accordance with the current recommendations of SMACNA and in accordance with standard drawings and project details.
2. Metal flashing flanges to which membrane is to be bonded shall be a minimum of four (4) inches in width, and secured to the substrate six (6) inches on center staggered with fasteners appropriate to the substrate type. The flanges shall be provided with a roughened surface that has been cleaned of all oil and other residue.
3. Metal edges that will be overlaid with membrane shall be provided with a 1/4" min. hemmed edge.
4. Apply primer, resin and fleece to metal flange, extending membrane to outside face of metal edging, and to vertical face of metal base/curb flashing.

F. Membrane Flashing – General:

1. Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.

2. Primer, resin, and fleece mixing and application methods as specified for field membranes are also suitable for membrane flashing.
3. Fleece shall overlap 2" (5 cm) minimum for all joints. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.

G. Pipes, Conduits, and Unusually Shaped Penetrations:

1. Flash all penetrations using cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane. Flashing material shall be the same resin used in the field membrane with fleece reinforcement.
2. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

H. Drains and Scuppers:

1. Acceptable drain and scupper materials are cast iron, cast aluminum, and copper.
2. Connect new drains and scuppers to existing storm sewer system.
3. Alternatively, replace all broken or damaged parts of existing drains and scuppers, or provide and install an acceptable insert.
4. Flash drains and scuppers using cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane. Flashing material shall be the same resin used in the field membrane with fleece reinforcement.
5. Flashing material shall extend four (4) inches minimum onto drain, scupper, or insert flange.
6. Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.

I. Hot Stacks:

1. Protect the membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 150 degrees F. In all such cases flash to an intermediate "cool" sleeve.
2. Fabricate "cool" sleeve in the form of a metal cone using galvanized metal in accordance with Membrane manufacturer's details.
3. Flash all penetrations using cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane. Flashing material shall be the same resin used in the field membrane with fleece reinforcement.
4. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

J. Flexible Penetrations:

1. Provide a weathertight gooseneck of round cross-section for each penetration or group of penetrations. Set in water cut-off mastic and secure to the structural substrate.
2. Acceptable gooseneck material is copper, of a sheet weight appropriate for the application.
3. Flash all penetrations using cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane. Flashing material shall be the same resin used in the field membrane with fleece reinforcement.
4. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

K. Walls, Curbs and Base Flashings:

1. Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.
2. Flash all walls, curbs and base flashings using cold fluid-applied reinforced (PMMA) methyl-methacrylate waterproofing membrane. Flashing material shall be the same resin used in the field membrane with fleece reinforcement.
3. Reinforce all transition locations and other potential wear areas with a four (4) inch wide polyester fleece bottom layer evenly positioned over the transition prior to installing the exposed flashing layer.
4. Reinforce all inside and outside corners with a four (4) inch diameter conical piece of fleece prior to installing the exposed flashing layer.
5. All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.
6. Extend flashing a minimum of four (4) inches onto the field substrate surface.

L. Drip Edges and Gravel Stops:

1. Metal drip edges and gravel stops shall be installed to solid substrate surfaces only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials are not acceptable.
2. Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8 inch wide strip of membrane adhered to both the securement flange and to the field membrane.
3. For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate polyester fleece bottom layer positioned behind the face area and extending a minimum of four (4) inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.

M. Field Fabricated Control or Expansion Joint Flashing:

1. Control or expansion joints in excess of two (2) inches in width require the use of a separate engineered joint system.
2. Control or expansion joints two (2) inches or less in width may be flashed with two layers of cold fluid-applied (PMMA) methyl-methacrylate waterproofing membrane and a compressible foam or rubber insert. Use polyester reinforcing fleece bottom and top layer.
3. Grind or otherwise bevel the inside edges of the joint opening to provide a smooth transition edge for the fleece.
4. Flashing typically consists of polyester reinforcing fleece bottom layer looped into the joint as a cradle, a compressible foam or rubber insert at 25% compression fitted into the joint, and a polyester fleece top layer applied over the joint. Extend both fleece layers four (4) inches minimum onto the field substrate on both sides of the joint.
5. Apply the field membrane over the entire joint area.

N. Electrical Conduit, Gas Lines and Lightning Protection

1. Supports for electrical conduit and gas lines greater than one (1) inch in diameter require the use of a separate engineered support system.
2. Supports for electrical conduit and gas lines one (1) inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with two-component Alsan RS Paste or a single-component, high quality polyurethane sealant supplied by membrane manufacturer.

3.09 BONDING LAYER

A. Tiles Set in Mortar / Concrete Wear Surface Applied Over Bond Coat

1. Where setting of tiles or a top pour of concrete is required, provide and install Membrane Manufacturer's approved two-component (PMMA) methyl-methacrylate based bond/wearing coating with #2 (1.0 – 1.6 mm) quartz aggregate additive broadcasted into wet resin.

Note: Roof/deck substrate must be approved by the membrane manufacturer prior to project start-up.

2. Premix resin thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in color.
3. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.
4. Apply Alsan RS 230 Field and/or Alsan RS 230 Flash resin at a minimum rate of approximately 0.14 kg/sf (1.5 kg/m²). Product shall be applied with a roller to achieve a smooth and level surface. All unevenness and membrane overlaps shall be smoothed out. Broadcast #2 kiln dried sand at 30 lbs/100 ft² into wet surface of coating to provide mechanical adhesion for the mortar. Avoid any traffic for a minimum of two (2) hours to allow for surfacing to cure.

5. Apply tile and mortar set or pour concrete wear surface over the cured Alsan RS 230 Field and/or Alsan RS 230 Flash resin per specifier requirements.

3.10 WEARING AND SURFACING (OPTIONAL)

A. Aesthetic Color Finish Coating

1. Where specified, provide and install Membrane Manufacturer's approved two-component (PMMA) methyl-methacrylate based color finish surfacing coating applied over clean, fully cured membrane.
2. Premix Alsan RS 288 Finish resin thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in color.
3. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.
4. Apply Alsan RS 288 Finish coating at a rate of approximately 0.028 kg/sf (0.3 kg/m²). Product shall be applied with a lambswool roller to achieve a smooth and level surface. Avoid any traffic for a minimum of one (1) hour to allow for surfacing to cure.
5. Optional Alsan RS Deco Chips: Apply Alsan RS 288 Finish coating at a rate of approximately 0.056 kg/sf (0.6 kg/m²). Products shall be applied with a lambswool roller to achieve a smooth and level surface. Broadcast the specified Alsan RS Deco Chips into the wet color finish by hand or hopper spray gun at a minimum rate of 0.019 kg/sf (0.2 kg/m²). Allow to cure and sweep away excess chips. Avoid any traffic for a minimum of one (1) hour to allow for surfacing to cure.

B. Aggregate Light Pedestrian Slip-Resistant Finish Surfacing

1. Where specified, provide and install Membrane Manufacturer's approved two-component (PMMA) methyl-methacrylate based finish surfacing coating with slip-resistant aggregate additive applied over clean, fully cured membrane.
2. Premix all Alsan RS resins thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in color.
3. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.
4. Apply Alsan RS 288 Finish resin at a minimum rate of approximately 0.065 kg/sf (0.7 kg/m²). Product shall be applied with a lambswool roller to achieve a smooth and level surface. Broadcast optional kiln-dried sand or colored quartz aggregate surfacing at approximate rate of 0.46 kg/sf; 1.0 lbs/sf; (5.0 kg/m²) or as recommended by manufacturer into wet surface of coating to provide slip-resistant protective surfacing. Avoid any traffic for a minimum of two (2) hours to allow for surfacing to cure. Remove all excess and loose quartz surfacing with broom, vacuum and/or oil-free blower. Seal natural quartz silica aggregate surfacing with an additional Alsan RS 288 Finish pigmented coating application at a rate of approximately 0.065 kg/sf (0.7 kg/m²). Seal colored quartz silica aggregate surfacing with an additional Alsan RS 281 Finish translucent coating application at a rate of approximately 0.065 kg/sf (0.7 kg/m²).

Products shall be applied with a rubber flat blade squeegee and a lambswool roller to achieve a uniform surface. Avoid any traffic for a minimum of one (1) hour to allow for coating to cure.

5. Optional Textured Surfacing: Apply Alsan RS 290 Textured Finish at a minimum rate of approximately 0.19 kg/sf (2.0 kg/m²). Product shall be applied with a smoothing trowel and/or a lambswool roller to achieve a smooth and level surface. Avoid any traffic for a minimum of one (1) hour to allow for coating to cure.
6. Optional Alsan RS Deco Chips: Apply Alsan RS 288 Finish coating at a rate of approximately 0.056 kg/sf (0.6 kg/m²). Product shall be applied with a lambswool roller to achieve a smooth and level surface. Broadcast the specified Alsan RS Deco Chips into the wet color finish by hand or hopper spray gun at a minimum rate of 0.019 kg/sf (0.2 kg/m²). Allow to cure and sweep away excess chips. Avoid any traffic for a minimum of one (1) hour to allow for surfacing to cure.

C. Wearing Layer with Slip-Resistant Finish Surfacing

1. Where balcony/deck traffic load is required, provide and install Membrane Manufacturer's approved two-component (PMMA) methyl-methacrylate based smoothing and finish surfacing coating with slip-resistant aggregate additive applied over clean, fully cured membrane.

Note: Roof/deck substrate must be approved by the membrane manufacturer prior to project start-up.

2. Premix all Alsan RS resins thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in color.
3. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.
4. Apply Alsan RS 233 Self-Leveling Mortar resin at a minimum rate of approximately 0.37 kg/sf (4.0 kg/m²). Product shall be applied with a smoothing trowel to achieve a smooth and level surface. All unevenness and membrane overlaps shall be smoothed out. Broadcast optional kiln-dried sand or colored quartz surfacing at approximate rate of 0.46 kg/sf; 1.0 lbs/sf; (5.0 kg/m²) or as recommended by manufacturer into wet surface of coating to provide slip-resistant protective surfacing. Avoid any traffic for a minimum of two (2) hours to allow for surfacing to cure. Remove all excess and loose quartz surfacing with broom, vacuum and/or oil-free blower. Seal natural quartz silica aggregate surfacing with an additional Alsan RS 288 Finish pigmented coating application at a rate of approximately 0.065 kg/sf (0.7 kg/m²). Seal colored quartz silica aggregate surfacing with an additional Alsan RS 281 Finish translucent coating application at a rate of approximately 0.065 kg/sf (0.7 kg/m²). Products shall be applied with a rubber flat blade squeegee and a lambswool roller to achieve a uniform surface. Avoid any traffic for a minimum of one (1) hour to allow for coating to cure.
5. Optional Textured Surfacing: Apply Alsan RS 233 Self-Leveling Mortar resin at a minimum rate of approximately 0.37 kg/sf (4.0 kg/m²). Product shall be applied with a smoothing trowel to achieve a smooth and level surface. All unevenness and membrane overlaps shall be smoothed out. Depending on the texture required apply Alsan RS Textured Coating (rough) at a minimum rate of approximately 0.325 kg/sf (3.5 kg/m²) or Alsan RS 290 Textured Finish (medium) at a minimum rate of

approximately 0.19 kg/sf (2.0 kg/m²). Products shall be applied with a smoothing trowel and/or lambswool roller to achieve a uniform surface. Avoid any traffic for a minimum of one (1) hour to allow for coating to cure.

6. Optional Alsan RS Deco Chips: Apply Alsan RS 233 Self-Leveling Mortar resin at a minimum rate of approximately 0.37 kg/sf (4.0 kg/m²). Product shall be applied with a smoothing trowel to achieve a uniform surface. Avoid any traffic for a minimum of one (1) hour to allow for coating to cure. Apply Alsan RS 288 Finish coating at a rate of approximately 0.056 kg/sf (0.6 kg/m²). Product shall be applied with a lambswool roller to achieve a smooth and level surface. Broadcast the specified Alsan RS Deco Chips into the wet color finish by hand or hopper spray gun at a minimum rate of 0.019 kg/sf (0.2 kg/m²). Allow to cure and sweep away excess chips. Avoid any traffic for a minimum of one (1) hour to allow for surfacing to cure.

D. Flashings Finish Color Coating:

1. Where specified, provide and install Membrane Manufacturer's approved two-component (PMMA) methyl-methacrylate based smoothing and finish pigmented coating applied over clean, fully cured flashing membrane.
2. Premix all Alsan RS resins thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in color.
3. Add the pre-measured Catalyst Powder to resin and mix with the same agitator for 2 minutes or until the powder is completely mixed. The catalyst is completely dissolved when there are no white specs remaining.
4. After installation of the flashing membrane and surfacing layer, apply Alsan RS Paste to all vertical seams (flashings) to smooth out reinforcement membrane overlaps. Completely cover seam edges using a putty knife to achieve smooth and uniform appearance. Allow to cure for minimum of one (1) hour. Apply additional coat of Alsan RS 288 Finish pigmented coating at a rate of approximately 0.028 kg/sf (0.3 kg/m²). Product shall be applied with a lambswool roller to achieve a smooth and uniform surface. Allow to cure for a minimum of one (1) hour.

3.11 OVERBURDEN INSTALLATION (Optional)

A. Drainage Mat:

1. Install drainage course of Sopra-Drain 500, Sopra-Drain 650 or Sopranature-Drain on horizontal and vertical cured Alsan RS 230 membrane surfaces. Allow to lay flat.
2. Cut and fit drainage mat per manufacturer's specifications to fit the perimeter and penetrations.
3. Bond all overlap edges to adjacent drainage course with an acceptable adhesive to ensure geotextile integrity.
4. Install subsequent overburden materials as soon as possible.

B. Insulation Placement

1. Loose lay insulation boards in a staggered manner. Butt all boards tightly. Install insulation within the required distances of all projection, penetrations, etc. In multi-

layer applications the bottom layer must be the thickest layer and have a minimum thickness of 2" (50.8 mm).

C. Filter Fabric Placement

1. When installing stone ballast or pavers position the filter fabric over the insulation so that all edges overlap a minimum of 1 foot.
2. Install fabric so that no joints will exist between the sheets parallel and to within 6 feet of the roof perimeter. Extend the fabric approximately 2" to 3" above the ballast at the perimeter and all penetrations.
3. Fabric should be extended to drain bases or bonnets, but should not cover drains or restrict water flow to the drain. Additional fabric should be installed around penetrations in order to prevent stone entry into the space between the penetration and the insulation.

D. Overburden Placement

1. Architectural Pavers or Stone Ballast
 - a. Install finish pavers, on pavers support pedestal (as required), in accordance with Manufacturer's recommendations and architectural layout.
 - b. Install stone ballast evenly through out roof area per manufacturer's recommendations.
2. Green Roof Garden
 - a. Install planting mediums, drainage requirements, plant types and other necessary components per the requirements of the manufacturer and specifier.

3.12 TEMPORARY CLOSURES & WATERSTOPS

- A. Contractor shall be responsible to ensure that moisture does not damage any completed section of the new waterproofing system. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition. All temporary closures shall be made as recommended or required by the membrane manufacturer.

3.13 PROTECTION

- A. Upon completion of waterproofing and flashings (including all associated work), institute appropriate procedures for surveillance and protection of waterproofing during remainder of construction period. Protect all areas where membrane has been installed.

3.14 CLOSEOUT

A. Correction of Work:

1. Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the Membrane Manufacturer's inspections shall be corrected and/or replaced at Contractor's expense.

B. Clean-Up:

1. Site clean-up, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.

END OF SECTION