

Attachment "B"

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

070150 Preparation for Re-Roofing

075419 Polyvinyl-Chloride (PVC/TPA) Roofing Master

SECTION 070150 - PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof tear-off.
2. Removal of base flashings.
3. Uplift securement.
4. Roof replacement preparation.
5. Removal and reinstallation of indicated components, accessories, and equipment.

B. Related Requirements:

1. Division 01 Section "Summary" for use of the premises and phasing requirements, and for restrictions on use of the premises due to Owner or tenant occupancy.
2. Division 01 Section "Photographic Documentation" for photographs taken before and during re-roofing preparation.
3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental protection measures.
4. Division 01 Section "Construction Waste Management and Disposal" for disposal, salvaging, and recycling of demolition and construction waste and submittal of Waste Management Plan.
5. Division 01 Section "Sustainable Design Requirements" for general requirements for sustainable design.
6. Division 07 Section "Sheet Metal Flashing and Trim" for formed metal roof flashings and counterflashings.
7. Division 07 Section "Roof Specialties."
8. Division 23 Sections for HVAC equipment removal and reinstallation.
9. Division 26 Sections for electrical equipment disconnection and reconnection.

- C. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices. Work of this Section is affected by metal deck removal and replacement unit price.

1.3 DESCRIPTION OF WORK

- A. Re-roofing preparation Work consists of the following:

- 1. Preparation for Roof Area RA#1: ASB Building:
 - a. Preparation for: Roof replacement.
 - b. Existing Roof Type: Polyurethane foam.
 - c. Existing Deck Type: Metal deck.
 - d. Roof tear-off.
 - e. Removal and reinstallation of indicated components, accessories, and equipment.
 - f. Salvaging of non-hazardous demolition and construction waste.
 - g. Recycling of non-hazardous demolition and construction waste.
 - h. Uplift securement.
 - i. Removal of base flashings.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.5 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Roof Tear-Off: Removal of existing membrane roofing system from deck.
- C. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- D. Existing to Remain: Existing items of construction that are not indicated to be removed.
- E. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

- F. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- G. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- H. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- I. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- J. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer for refrigerant recovery technician.
- B. Schedule of Re-Roofing Preparation Activities: Indicate the following:
 - 1. Detailed sequence of re-roofing preparation work, with starting and ending dates for each activity. Ensure occupants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building.
- C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Reroofing Conference: Conduct conference at Project site.

1. Meet with Owner; Owner's insurer if applicable; testing and inspecting agency representative; roofing system manufacturer's representative; deck Installer; roofing Installer including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing system tear-off and replacement including, but not limited to, the following:
 - a. Reroofing preparation, including membrane roofing system manufacturer's written instructions.
 - b. Procedures for salvaging and recycling of demolition and construction waste
 - c. Temporary protection requirements for existing roofing system that is to remain during and after installation.
 - d. Existing roof drains and roof drainage during each stage of reroofing, and roof drain plugging and plug removal requirements.
 - e. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Existing deck removal procedures and Owner notifications.
 - g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
 - h. Structural loading limitations of deck during reroofing.
 - i. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.
 - j. HVAC shutdown and sealing of air intakes.
 - k. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
 - l. Asbestos removal and discovery of asbestos-containing materials.
 - m. Governing regulations and requirements for insurance and certificates if applicable.
 - n. Existing conditions that may require notification of Architect before proceeding.

1.9 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 48 hours' notice of activities that may affect Owner's operations.

1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
 2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.
- B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
- D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
- E. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work. Existing roof will be left no less watertight than before removal.
 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- F. Hazardous Materials: Present in building to be reroofed. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.
 3. Coordinate with hazardous material remediation subcontractor to prevent water from entering existing roofing system or building.

PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

- A. Metal Flashing Sheet: Metal flashing sheet is specified in Section 076200 "Sheet Metal Flashing and Trim."

PART 3 - EXECUTION

3.1 PREPARATION, GENERAL

- A. Pollution Control: Comply with environmental regulations of authorities having jurisdiction. Limit spread of dust and debris.
 - 1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 2. Remove debris from building roof by chute, hoist, or other device that will convey debris to grade level.
- B. Refrigerant: Before starting re-roofing preparation, remove refrigerant from mechanical equipment to be removed and reinstalled, according to 40 CFR 82 and regulations of authorities having jurisdiction.
- C. Air Intake Shutdown: Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- D. Temporary Weather Protection: During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- E. Verify that rooftop utilities and service piping have been shut off before beginning the Work.

3.2 ROOF TEAR-OFF

- A. General: Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
- B. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing using a power broom.
- C. Remove protection mat and insulation from protected roofing membrane.
 - 1. Discard extruded-polystyrene insulation that is wet and exceeds 8 lb/cu. ft. (128 kg/cu. m).
 - 2. Store extruded-polystyrene insulation for reuse and protect from physical damage.
- D. Roof Drainage: Remove roof drainage items indicated for removal.
- E. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
 - 1. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.

2. Remove excess asphalt from steel deck. A maximum of 15 lb/100 sq. ft. (0.72 kg/sq. m) of asphalt is permitted to remain on steel decks.

3.3 DECK PREPARATION

- A. Roof Deck: If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
 1. Unsuitable Deck: If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.

3.4 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

3.5 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by preparation for re-roofing operations. Return adjacent areas to condition existing before operations began.

END OF SECTION 070150

SECTION 075419 - POLYVINYL-CHLORIDE (PVC/TPA) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered thermoplastic PVC/TPA roofing system on metal deck, including:
 - a. Install tapered isocyanurate engineered slope system to create minimum 1/4" per 12" positive slope with a minimum average insulation value of R-17.
 - b. Taper system shall utilize existing perimeter edge height. Taper system base layer shall use Tremco Low-Rise Foam Insulation Adhesive for base layer. All other layers shall be adhered using either Tremco Low-Rise Foam Insulation Adhesive OR Tremco Premium IV hot asphalt adhesive.
 - c. Tapered insulation and cover board shall be as provided by Tapered Design Center. For the complete pre-authorized isocyanurate tapered insulation board design, engineering and product, contact taper@tdcroof.com ; Darryl Carnevale at 714-719-6601. This system is pre-approved for warranty by the roofing system manufacturer.
 - d. Over the tapered isocyanurate system install a 1/4" Tremco Securock cover board using Tremco Low-Rise Foam Insulation Adhesive OR Tremco Premium IV hot asphalt adhesive.
 - e. Install 60 Mil. TPA FB in Tremco Premium IV hot asphalt adhesive or Tremco, Fleece Back WB Single Ply Bonding Adhesive.per manufactures written installation guidelines.
2. Install new Tremco standard edge metal fabricated from Tremco TPA clad metal.
 3. Match existing fascia with a hemmed drip edge and install with 1/2" spaced butt joints, 6" batten covers and seal top of flange to roof over TPA with 6" stripping covers heat welded.
 - a. Nail flange in a bedding of sealant with 2 staggered rows of nails 6" o.c.
 4. Install new galvanized counter flashing skirts tucked under the existing HVAC curb pans.
 5. Roof top vent pipes shall be coated with any Tremco white coating.
 6. Install new Cooper B Line Dura-bloc support pads or equal under pipe runs.
 7. Disconnect and set aside existing HVAC units leaving duct work in place.a. Relocate plumbing lines as required to install curbsb. Fabricate new wood curbs meeting NRCA guidelines c. Wrap over new curbs with TPAFB membraned. Install new 24 gage galvanized sheet metal pan covers with 4" drop face and hemmed drip edge to outside.e. Reset and reconnect HVAC unit plumbing, electrical and seal unit to the existing ductwork. Re-seal all open duct joints with Tremlite mastic and fabric as needed.
- D. Roofing contractor shall co-ordinate with District Staff to ensure that roof top Vents and HVAC unit vents on adjacent roofs are turned off, shall be temporarily closed or sealed up when hot asphalt materials are being applied.
3. Base sheet.
4. Roof insulation.

5. Roof insulation cover board.
6. Walkway material.

B. Related Sections:

1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Preparation for Re-Roofing" for recover board beneath new membrane roofing.
3. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
4. Division 07 Section "Roof Specialties" for manufactured copings, roof edge flashings, roof edge drainage systems, counterflashings, and reglets.
5. Division 07 Section "Roof Accessories" for manufactured roof curbs and supports, hatches, and manufactured penetration flashings.
6. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

C. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Sustainable Design Submittals:

1. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
2. Product Data for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1. Base flashings and membrane terminations.
 - a. Indicate details meet requirements of NRCA and FMG required by this Section.

2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: For the following products:

1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
2. Roof insulation.
3. Walkway pads or rolls.
4. Metal termination bars.
5. Battens.
6. Six insulation fasteners of each type, length, and finish.
7. Six roof cover fasteners of each type, length, and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.
 1. Include letter from Manufacturer written for this Project indicating approval of Installer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- D. Warranties: Unexecuted sample copies of special warranties.
- E. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing

products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

- B. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:
 - 1. An authorized full-time technical employee of the manufacturer.
 - 2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products.
- D. Preinstallation Roofing Conference: Conduct conference at Project site.
 - 1. Review drawings and specifications.
 - 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. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 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 if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. 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, approval or listing agency markings, and directions for storing and mixing with other components.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 - 3. Remove temporary plugs from roof drains at end of each day.
 - 4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

- A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Manufacturer's Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

- C. Installer's Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of membrane roofing such as single ply roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.
- D. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:
 - 1. Sheet metal flashing and trim, including roof penetration flashings.
 - 2. Manufactured copings, roof edge, counterflashings, and reglets.
 - 3. Roof curbs, hatches, and penetration flashings.
 - 4. Roof and parapet expansion joint assemblies.
 - 5. Metal roof, wall, and soffit panels and trim.
 - 6. Manufacturer Inspection Requirement: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections is included in the Contract Sum. Inspections to occur in Years [2], [5], [10] [and] [15] following completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Tremco, Inc.
- B. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products.
- C. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated on Drawings. Identify products with appropriate markings of applicable testing agency.
- E. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- G. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.3 THERMOPLASTIC MEMBRANE MATERIALS

- A. Thermoplastic PVC/TPA sheet, fleece-backed, ASTM D 4434 Type IV internally fabric reinforced, Energy Star qualified, CRRC listed, and California Title 24 Energy Code compliant.
1. Basis of design product: Tremco, TPA FB Roof Membrane.
 2. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 751: 350 lbf/in (61 kN/m).
 3. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 751: 100 lbf (440 N).
 4. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 751: Machine direction, 35 percent; Cross machine direction, 33 percent.
 5. Minimum Thickness, nominal, less backing, ASTM D 751: 60 mils (1.5 mm).
 6. Exposed Face Color: White.
 7. Reflectance, ASTM C 1549: 86 percent.
 8. Thermal Emittance, ASTM C 1371: 0.86.
 9. Solar Reflectance Index (SRI), ASTM E 1980: 108.
 10. Recycled Content, minimum: 25 percent preconsumer.

11. Acceptable Alternate Products: : Subject to requirements, acceptable products include PVC Sheet: ASTM D 4434/D 4434M, Type III, fabric reinforced and fabric-backed, or KEE Sheet: ASTM D 6754/D 6754M, fabric reinforced and fabric-backed, by listed manufacturer.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC/TPA sheet membrane.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

- a. Plastic Foam Adhesives: 50 g/L.
- b. Gypsum Board and Panel Adhesives: 50 g/L.
- c. Multipurpose Construction Adhesives: 70 g/L.
- d. Fiberglass Adhesives: 80 g/L.
- e. Contact Adhesive: 80 g/L.
- f. Other Adhesives: 250 g/L.
- g. PVC Welding Compounds: 510 g/L.
- h. Adhesive Primer for Plastic: 650 g/L
- i. Single-Ply Roof Membrane Sealants: 450 g/L.
- j. Nonmembrane Roof Sealants: 300 g/L.
- k. Sealant Primers for Nonporous Substrates: 250 g/L.
- l. Sealant Primers for Porous Substrates: 775 g/L.

3. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Membrane Bonding Adhesive:

1. Elastomeric low-VOC water-based contact-type adhesive for bonding TPA fleece-backed and TPO fleece-backed single ply membranes and flashings to substrates.
 - a. Basis of design product: Tremco, Fleece Back WB Single Ply Bonding Adhesive.
 - b. Tremco Premium IV hot asphalt adhesive
 - c. VOC, maximum, ASTM D 3960: 200 g/L.
- C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 mm by 3 mm) thick; with anchors.
- D. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch (25 mm wide by 1.3 mm) thick, prepunched.
- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to membrane roofing system manufacturer.
- F. Termination Joint Sealant: Silicone, S, NS, 25 or 50, NT: Single-component, nonsag, plus 25 to 50 percent and minus 25 to 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT, and compatible with adjacent materials.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION MATERIALS

- A. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
- B. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- C. Cellulosic fiber reinforced water-resistant gypsum panel, ASTM C 1278/C 1278M.
 1. Basis of design product: Tremco/USG Securock.
 2. Thickness: 1/4 inch (6mm).
- D. Cold fluid-applied bead-applied low-rise adhesive, two-component solvent-free low odor elastomeric urethane, formulated to adhere roof insulation to substrate.
 1. Basis of design product: Tremco, Low Rise Foam Insulation Adhesive.
 2. Flame Spread Index, ASTM E 84: 10.
 3. Smoke Developed Index, ASTM E 84: 30.
 4. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 0 g/L.

5. Tensile Strength, minimum, ASTM D 412: 250 psi (1724 kPa).
 6. Peel Adhesion, minimum, ASTM D 903: 17 lbf/in (2.98 kN/m).
 7. Flexibility, 70 deg. F (39 deg. C), ASTM D 816: Pass.
- E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 ASPHALT MATERIALS

- A. ASTM D 312 Type IV hot-melt asphalt.
1. Basis of design product: Tremco, Premium IV.
 2. Softening Point, min/max, ASTM D 36: 215225 deg. F (102107 deg. C).
 3. Ductility at 77 deg. F, minimum, ASTM D 113: 2.5 cm.
 4. Penetration at 77 deg. F (25 deg. C), min/max, ASTM D 5: 1530 dmm.
- B. Asphalt primer, water-based, polymer modified.
1. Basis of design product: Tremco, TREMprime WB.
 2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

2.7 WALKWAY MATERIALS

- A. Walkway roll, reinforced PVC/TPA membrane roll with serrated slip-resistant surface, fabricated for heat welding to compatible PVC/TPA membrane surface.
1. Basis of design product: Tremco, TPA Walkway Roll.
 2. Roll Size: 36 inches by 60 foot (914 mm by 18.3 m).
 3. Thickness: 0.080 inch (2 mm).
 4. Color: Grey.
- B. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Steel Roof Deck:
 - a. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
 - b. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
4. Existing Prepared Roof Substrate: Verify that existing insulation and substrate is sound and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

3.3 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Install wood cants, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.
- C. Install roofing membrane, base flashings, and component materials in compliance with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system as listed in FMG's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49.

- D. NRCA Installation Details: Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with perimeter fastening requirements of FM Global references if applicable:
1. Base Flashing at Parapet Wall: Plates TP-1 and TP-1S.
 2. Base Flashing and Counterflashing at Parapet Wall: Plates TP-5 and TP-5S.
 3. Base Flashing and Counterflashing at Parapet Wall, Movement Joint: Plates TP-6 and TP-6S.
 4. Base and Surface-mounted Counterflashing: Plates TP-4 and TP-4S.
 5. Perimeter Edge, Raised: Plates TP-2 and TP-2S.
 6. Perimeter Edge, Embedded Edge: Plates TP-3 and TP-3S.
 7. Perimeter Edge, Draining: Plates TP-3A and TP-3AS.
 8. Options for Perimeter Base Securement (Roof-to-Wall and Roof-to-Curb Intersections): Single Ply Table 7.1.
 9. Options for Perimeter Base Securement (Roof-to-Wall and Roof-to-Curb Intersections): Single Ply Table 7.2.
 10. Guide for Sheet Metal Fascia Edges for Thermoset and Thermoplastic Membrane: Single-Ply – Table 1.
 11. Scupper, Raised: Plates TP-21 and TP-21S.
 12. Gutter at Draining Edge: Plates TP-22 and TP-22S.
 13. Expansion Joint, with metal cover: Plates TP-7 and TP-7S and Division 7 Section “Sheet Metal Flashing and Trim.”
 14. Expansion Joint, with premanufactured cover: Plates TP-7A and TP-7AS and Division 7 Section “Roof Expansion Assemblies.”
 15. Curb Detail at Rooftop HVAC Units, Premanufactured: Plates TP-12 and TP-12S.
 16. Curb Detail at Rooftop HVAC Units, Job-Built, Wood: Plates TP-13 and TP-13S.
 17. Curb Detail at Skylight, Roof Hatch, and Smoke Vents: Plates TP-14 and TP-14S.
 18. Penetration, Structural Member: Plates TP-15 and TP-15S.
 19. Penetration, Sheet Metal Enclosure: Plates TP-16 and TP-16S.
 20. Penetration, Stack Flashing: Plates TP-17 and TP-17S.
 21. Penetration, Plumbing Vent: Plates TP-18 and TP-18S.

22. Penetration, Plumbing Vent, Premanufactured Boot: Plates TP-18A and TP-18AS.
23. Penetration, Pocket: Plates TP-19 and TP-19S.
24. Roof Drain: Plates TP-20 and TP-20S.
25. Guide for Clearances between Pipes / Walls / Curbs – Table 4.
26. Guide for Crickets and Saddles – Table 5.
27. Guide for Edge Scuppers with Tapered Saddles - Table 6.

3.4 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- F. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- G. Cover Boards: Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together.
 1. Secure cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 2. Adhere cover boards by setting in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining cover board in place.

3.5 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
 1. Install sheet according to ASTM D 5036.

- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Water-Based Bonding Adhesive: Apply to substrate at rate required by manufacturer. Install membrane immediately into adhesive, avoiding any air entrapment; do not allow adhesive to dry. Roll membrane into wet adhesive. Do not apply adhesive to splice area of membrane.
- E. Hot Asphalt Adhesive: Install roofing membrane sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
 - 1. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F.
- F. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- G. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- H. Welded Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- I. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

3.6 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Roofing Inspector: Contractor shall engage a qualified RCI registered RRO certified roofing inspector for a minimum of 3 full-time days on site to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."

- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419