

**Guide Specification
Section #07541
THERMOPLASTIC MEMBRANE ROOFING**

**CITY OF BEVERLY HILLS
ROXBURY CLUBHOUSE
RE-ROOFING PROJECT**

401 S. Roxbury Drive
Beverly Hills, CA 90210

PREPARED BY:

Van Dijk & Associates, Inc.

28 Hammond Street, Suite G
Irvine, CA 92618
(949) 586-3828

DATE OF ISSUE:
6/13/17

SECTION 07541
ADHERED
THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Scope

1. The existing roofing materials are to be removed and disposed of down to the wood substrate in accordance with all applicable laws and codes.
2. The inspection of the existing plywood and wood substrate and the replacement of any deteriorated or otherwise damaged areas with new to match existing on a unit cost basis.
3. Removal and replacement of existing coping at the perimeter and small dividing walls at equipment area.
4. Installation of round custom scuppers at exterior walls and between roof and small equipment areas.
5. The complete installation of all materials and accessories of each described roof system, and related mechanical or electrical work.

B. System Description

1. Flat Roof Areas

- a. Tear-off and dispose of the existing built-up roof system on both flat roof areas, including all base flashings, and existing sheet metal coping.
- b. The inspection of the existing plywood and wood substrate and the replacement of any deteriorated or otherwise damaged areas with new to match existing on a unit cost basis.
- c. Raise the HVAC curb height, where necessary, to meet the minimum 8-inch height requirement.
- d. Completely roof in the existing, and new curb, in accordance with roofing manufacturer's details.
- e. Remove three courses of tile at sloped roof areas (4 sides on center roofs and 2 sides of the middle roof between the two flat areas) to allow for the removal of existing gutter and flashings. The gutter and flashings will need to be removed in order to carry the new roof system under the installation under the existing sloped roof underlayment. Reinstall all flashings, gutters, underlayment (tie-in to existing underlayment), and tile. Replace all broken tiles with new to match existing.
- f. Add Alternate: Remove all tile from sloped roof areas (three areas), store for re-use, repair all damaged wood, install two layers of #30 new underlayment, and re-install tile.

- g. Over the properly prepared existing plywood deck substrate and vertical parapet walls, provide and install new mechanically attached ¼-inch thick protection DensDeck PRIME board in accordance with manufacturer's recommendations.
- h. Provide all materials and accessories to install a new 72-mil thick fiberglass reinforced extrusion spread coated PVC roof membrane, adhered over new DensDeck PRIME board using a VOC compliant water based adhesive, in accordance with manufacturer's recommendations.
- i. Contractor is to clean existing drains and drain lines.
- j. Install asphalt resistant 60-mil PVC flashing membrane adhered to the existing wall substrate using a VOC compliant solvent based adhesive. The top of the flashing membrane shall be extended over the top of the wall and down the outside face of the parapet wall.
- k. Install new standing seam bonderized sheet metal coping along the top of the parapet wall.
- l. Replace existing wood sleepers with new treated wood blocking, for condensate and chilled water lines. Install in accordance with manufacturer's requirements.

C. Special project conditions to be included in the base bid:

- 1. Prior to submitting a bid, the Bidders shall be approved applicators in accordance with the Submittal Section requirements.
- 2. Contractor is to coordinate with the City to remove and dispose of any and all obsolete equipment, pipes and electrical conduit.
- 3. Disconnection, manipulation and reconnection of existing electrical, mechanical, plumbing, duct work, etc., associated with proper roof installation.
- 4. All penetrations, including platforms, curbs, etc., are to be extended as necessary to create a minimum 8-inch flashing height above the new roof. The 8-inch minimum flashing height shall take into consideration new overlayment board elevations. Any flashings heights below 8-inches to be reviewed and accepted by material manufacturer and consultant prior to the installation of the new roofing system.
- 5. The roofing contractor is to allow areas with trapped moisture to dry out during the execution of the work and prior to installation of the new roofing materials.
- 6. New counterflashing inserts to have new fully soldered corner, and transition pieces shall be installed. New wind clips shall be included in the base bid at all counterflashing areas. All counterflashing shall be installed tight at the completion of the project.
- 7. At the roof system termination under coping at walls, the roofing system top edge termination is to be water sealed using a termination bar and urethane sealant. Urethane sealant is to be installed before termination bar installation behind the membrane, and is to be compressed by the termination bar while still fluid. Urethane sealant shall also be installed after termination bar installation to seal the top of the membrane at the termination bar receiver.

8. The work will include the inspection of the existing drain assemblies and the replacement of any defective or obsolete parts with new cast iron components. All existing plastic parts are to be replaced using cast iron. The completed drain assemblies must include functional clamping rings, secured to the drain bodies appropriately using clamping ring bolts and cast-iron drain screens, which fit into the clamping rings.
9. Any pipes, light in weight, running across the roof are to be supported using wood blocks. The wood block supports shall be wrapped in membrane and set on walk-tread material.
10. The work is to include new 22-gauge galvanized sheet metal pan flashings at all platform locations, as required.
11. New seismic securement of the mechanical units or pipe securement through pan flashing to be completed using suitable straps, fastened through the vertical face of the new pan flashings. The strap securement is to be sealed using rubber gaskets and urethane sealant.
12. The improperly mounted curb assemblies, secured over the existing roofing membrane, are to be disconnected to allow roof removal, then be properly secured to the surface of the structural roof deck. All work associated with this re-installation of improperly mounted curbs is to be included in the base bid work.
13. Unless otherwise specified, the existing sheet metal ducts are to be scraped clean and resealed using fabric and urethane sealant material. Any damaged flex connection flashings are to be replaced if damaged.
14. Fabrication and installation of all PVC clad sheet metal flashings, such as at edge flashing, transition flashings, scupper flashings, etc. Where exposed, the color of the PVC clad sheet metal flashings shall match the existing building color scheme, as approved by the City.
15. PVC clad sheet metal flashings are to include new flashings at all transition areas related to the new roof installation.
16. Membrane or prefabricated boot flashings are to be installed on all penetrations, including penetrations out of vertical surfaces.
17. Where existing roof component accessories, including but not limited to, heat vent pipe caps, storm collars, etc., are damaged or missing, new roof component accessories are to be installed to result in complete flashing and counterflashing of all locations.
18. The painting of all exposed metal flashings, pipes and ducts to match the existing building color scheme. The City must approve the color of all finishes, including roofing materials and painted items prior to finish installation.
19. The roofing applicator is responsible for barricading the exterior staging on site. Staging barricades must be installed to **prevent** any public pedestrian traffic from entering the work and staging areas. A minimum of 1/2 of all pathways must be left open for public access adjacent and past the staging areas.

D. Unit Prices: Contractor is to provide Unit Prices for the following:

1. Provide a separate cost per square foot on the Bid Proposal, for repair of any deteriorated or otherwise damaged plywood decking and deteriorated wood.

2. Provide a separate cost, per roof drain, on the Bid Proposal for installation of new roof drains to match existing. Remove and re-install decking as necessary to accomplish proper installation of the roof drain assembly.
3. Provide a separate cost, per lineal foot, on the Bid Proposal for installation of new roof drain lines to tie into existing drain lines. Size of new drain lines shall match that of existing.
4. Provide a separate cost, per lineal foot, on the Bid proposal for installation of additional walk pads, to be installed at locations directed by the City.

1.02 QUALITY ASSURANCE

- A. This roofing system shall be applied only by a Roofing Contractor authorized by the Manufacturer prior to bid ("Applicator"). The Roofing Contractor shall have at least five (5) years of experience as an applicator with the submitted manufacturer, as certified by the manufacturer.
- B. Upon completion of the installation and the delivery to Manufacturer by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and Manufacturer's requirements, an inspection shall be made by a Technical Representative of the Manufacturer and Consultant to review the installed roof system.
- C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Consultant.
- D. All work pertaining to the installation of PVC membrane and flashings shall only be completed by Applicator personnel trained and authorized by Membrane Manufacturer in those procedures.
- E. Membrane to have no formulation changes in the last ten (10) years as certified by the manufacturer.
- F. Manufacturer's warranty shall be "No Dollar Limit" for the replacement of defective materials and/or labor and shall not contain any exclusions for ponding water.

1.03 SUBMITTALS

- A. Submittals of Specific Materials: At the time of award, the Applicator shall submit to the Consultant six (6) copies of the following:
 1. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.
 2. Sample copy of Manufacturer's 20-year NDL Systems Warranty.
 3. Sample copy of Applicator's 5-year Workmanship Warranty.
 4. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or practices.
 5. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.
 6. Material Safety Data Sheets (MSDS) for all products to be used on the project.
 7. Provide shop drawings for any required tapered insulation and or crickets requirements behind mechanical units.

8. Contractor to submit a work schedule breaking down the sequence of work for the duration of the project, including coordination of any sub-trades necessary to complete the project.
9. Contractor to submit a listed of contact names and phone numbers including all sub-trades.
10. Contractors shall be pre-qualified by the Manufacturer of the roofing materials.

1.04 REFERENCE STANDARDS

ASTM	American Society for Testing and Materials Philadelphia, PA (215) 299-5585
CBC	California Building Code
FM	Factory Mutual Engineering and Research Norwood, MA (617) 762-4300
NEC	National Electric Code
NRCA	National Roofing Contractor Association Rosemont, IL (708) 299-9070
OSHA	Occupational Safety and Health Administration Washington, DC (202) 523-8036
SMACNA	Sheet Metal and Air Conditioning Contractors National Association Chantilly, VA (703) 803-2980
SPRI	Single-Ply Roofing Institute
UBC	Uniform Building Code - 1997
UL	Underwriters' Laboratories Northbrook, IL (708) 272-8800

1.05 CODE REQUIREMENTS

- A. The applicator is to submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work will commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.
- B. Factory Mutual Research Corporation (FM) – Norwood, MA
 1. FM 1-90 - Design Criteria for Wind Uplift
- C. Underwriters Laboratories, Inc. – Northbrook, IL
 1. Class A assembly

1.06 PRODUCT HANDLING

- A. All products delivered to the job site are to be in the original unopened containers or wrappings bearing all seals and approvals.
- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. Membrane rolls are to be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Un-vented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
- D. All adhesives shall be stored at temperatures between 40° F and 80° F.
- E. All flammable materials are to be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- F. All materials that are determined to be damaged by the Consultant's Field Representative or Manufacturer are to be removed from the job site and replaced at no cost to the City.

1.07 JOB CONDITIONS

- A. Roof materials may be installed under certain adverse weather conditions but only after consultation with Manufacturer, as installation time and system integrity may be affected.
- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, is to be installed. All seams are to be cleaned and heat welded before leaving the job site each day.
- C. All work is to be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive insulation, underlayment board, membrane or flashings to be dry. Should surface moisture occur, the Applicator is to provide the necessary equipment to dry the surface prior to application of new roof assembly.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops are to be installed at the end of each day's work and be completely removed before proceeding with the next day's work. Waterstops are not to emit dangerous or unsafe fumes and are not to remain in contact with the finished roof as the installation progresses. Contaminated membrane is to be replaced at no cost to the City.
- G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over an 11-ounce polypropylene felt is to be provided for all new and existing roof areas that receive rooftop traffic during construction.
- H. Prior to and during application, all dirt, debris and dust is to be removed from surfaces by sweeping, blowing with compressed air and/or similar methods.

- I. The Applicator is to follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- J. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) is to be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.
- K. The Applicator is to take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- L. Flammable adhesives and deck primers are not to be stored and not to be used in the vicinity of open flames, sparks and excessive heat.
- M. The Applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.

1.08 WARRANTIES

- A. **Manufacturer's 20-Year System Warranty:** Upon successful completion of the work to the Roofing Manufacturer's and City of Beverly Hills's satisfaction, and receipt of final payment, the twenty (20) Year System Warranty shall be issued. The System Warranty shall provide for the roof membrane, all accessories that comprise a roof system, and contractor labor. The Warranty shall be Non-Prorated provide for No Dollar Limit (NDL), and shall not exclude ponding water and no time limited shall be assigned for any such ponding water for the duration of the warranty period.
- B. **Applicator/Roofing Contractor 5 Year Warranty:** The Applicator shall supply the City of Beverly Hills with a separate five (5) year Workmanship Warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no cost to the City of Beverly Hills. The Applicator's warranty obligation shall run directly to the City of Beverly Hills.
- C. **City of Beverly Hills Responsibility:** City of Beverly Hills shall notify both Manufacturer and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

1.09 PRE-ROOFING CONFERENCE

- A. The Applicator, Consultant, related Subcontractors and Manufacturer(s) shall attend a pre-roofing conference. The pre-roofing conference should be scheduled a minimum 2 weeks prior to commencement of roofing. All curbs and penetrations should be in place prior to scheduling of meeting so that all parties can review substrates and field conditions.
- B. The meeting shall discuss all aspects of the project including but not limited to:
 - 1. Safety
 - 2. Set up
 - 3. Construction schedule
 - 4. Contract conditions
 - 5. Coordination of the work
 - 6. Review of roof system and installation
 - 7. Field conditions noted during deck walk

PART 2 - PRODUCTS

2.01 GENERAL

- A. Components to be used that are other than those supplied or manufactured by Manufacturer may be submitted for review and acceptance by the Consultant. Acceptance of any other product is only for a determination of compatibility with Manufacturer's products and not for inclusion in the Manufacturer's warranty.
- B. Roofing materials need to be Sarnafil or approved equal. Use of other products than what is specified herein need to be approved by the City of Beverly Hills, one week before the bid due date.

2.02 MEMBRANE

- A. Adhered Systems:
 - 1. Sarnafil® G410-18 72-mil with fiberglass reinforced membrane with a lacquer coating manufactured using an extrusion coating process, no known equal. G410-24 96 mil membrane. Membrane shall conform to ASTM D4434-96 (or latest revision), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II, Grade I, or approved equal.
 - 2. Color of all membrane shall be "Energy Star White." The membrane shall have an initial solar reflectance of 83% and a corresponding emissivity of 92%. In combination, the total solar reflectance index value (SRI) of the membrane shall be 104.

2.03 FLASHING MATERIALS

- A. Flashing Membrane (60 mil "G410" Flashing Membrane): A fiberglass reinforced membrane adhered to approved substrate using VOC compliant adhesive. Color of flashing membrane shall be "Energy Smart White." The flashing membrane shall conform to ASTM D4434-96, and be a Type II, Grade 1 flashing membrane. For asphalt contaminated substrates, use G-459 flashing membrane, or approved equal.
- B. Perimeter Edge Flashing (PVC Clad Metal): A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Clad is a 25 gauge, G90 galvanized metal sheet with a 20-mil unsupported Energy Smart White membrane laminated on one side. The dimensions of clad are 4 feet x 10 feet.

2.04 PROTECTION BOARD

- A. DensDeck® Prime (Adhered Systems): Fire-tested, gypsum hardboard with glass-mat facers, with a non-asphaltic, highly proprietary heat-cured coating on one side. DensDeck Prime shall have a spread flame of 0 and a smoke development of 0 when tested in accordance with ASTM E84 and it passes the E-136 non-combustibility test Dens-Deck Prime is provided in a 4' x 8' board size and in thicknesses of 1/4-inch.

2.05 ATTACHMENT COMPONENTS

- A. Insulation Plate: Used with an approved fastener to attach insulation boards to roof deck. Insulation plate is a 3-inch square or round, 26-gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Insulation plate is to meet Factory Mutual 4470 for corrosion resistance.
- B. Concrete Fastener (CD-10): A corrosion-resistant nail-in type fastener used with peel stop to attach the field membrane to the concrete deck substrate at the base of wall, curb, and parapet transitions.

- C. Peel Stop: An extruded aluminum, low profile bar used with certain approved fasteners to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate. Peel stop is a 1-inch wide, flat aluminum bar 1/8-inch thick that has predrilled holes every 6-inches on-center.
- D. Membrane Adhesive (2121 Water-Based Adhesive): A water-based adhesive used to attach the membrane to horizontal or near-horizontal substrates. There is a significant increase in drying time due to an increase in humidity and/or a decrease in temperature. Do not install when outdoor or substrate temperatures during drying period are expected to fall below 40° F. Do not allow adhesive to skin-over or surface-dry prior to installation of membrane. Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

2.06 ACCESSORIES

- A. Aluminum Tape: A 2-inch-wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at PVC clad joints.
- B. Membrane Cleaner: A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Membrane cleaner is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled.
- C. Pre-fabricated PVC Cones: A prefabricated vent pipe flashing made from 48-mil thick G410 membrane. The pre-fabricated PVC cones are available in five different sizes.
- D. Pre-fabricated PVC Corner: Prefabricated outside and inside flashing corners made of 60-mil thick membrane that are heat-welded to membrane or PVC clad base flashings. Prefabricated corners are available in 2 outside sizes and 1 inside size.
- E. VOC Compliant Adhesive for Vertical Surfaces: A VOC compliant solvent-based reactivating-type adhesive used to attach the membrane to the flashing substrate.
- F. Walk Pads: 96-mil PVC walk treads with embossed surface as supplied by primary roofing material manufacturer.

2.07 SEALANTS

- A. Multi-Purpose Sealant: One-part, moisture curing, gun grade sealant used at certain flashing details for termination of the waterproofing assembly. The sealant is a polyurethane sealant and VOC compliant.
- B. Depending on substrates, the following sealants are options for temporary overnight tie-ins:
 - 1. Spray-applied, water-resistant urethane foam.
 - 2. Mechanical attachment with rigid bars and compressed sealant.

2.08 RELATED MATERIALS

- A. Fasteners and Anchors: All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1-inch and be approved for such use by the fastener manufacturer.
- B. Wind Clips: Shall be made of 22-gauge galvanized sheet metal, in accordance with detailed drawings.
- C. Platform Covers: Shall be made of 22-gauge galvanized sheet metal to match size of existing platform cover. Spot weld and fully solder all seams in accordance with detail drawing.
- D. Sheet Metal Counterflashing/Inserts: Shall be made of 24-gauge galvanized sheet metal, in accordance with detail drawing.
- E. Custom Termination/Transition Metals: Shall be made of 24-gauge galvanized sheet metal, in accordance with detail drawing. All transition metal shall be fully soldered seams.
- F. Wood Blocking: All wood blocking for exposed sleepers shall be treated lumber or redwood, cut to size in accordance with detail drawing.
- G. Heater Stacks and Storm Collars: Shall be made of 24-gauge galvanized sheet metal, in accordance with detail drawing. Attached with stainless steel cinch bands.
- H. Backer Rod & Sealant Material at Cold Joints: Sikaflex -15LM or as recommended by Sika representative.
- I. Concrete Repair Materials: SikaRepair 222 or 223 or as recommended by Sika representative.

PART 3 - EXECUTION

3.01 SUBSTRATE PREPARATION

- A. The Applicator is to load materials on the rooftop in such a manner to eliminate risk of deck overload due to concentrated weight. The Roofing Contractor is to ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location. The Roofing Contractor shall also be responsible for scheduling any required site deck inspections by local city inspectors prior to installing new roof system.

3.02 SUBSTRATE INSPECTION

- A. A dry, clean and smooth substrate shall be prepared to receive the roof system.
- B. The Applicator is to inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.
- C. The substrate is to be clean, smooth, dry, and free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing will not start until all defects have been corrected.
- D. All roof surfaces shall be free of moisture.
- E. Membrane is to be applied over compatible and accepted substrates only.

3.03 INSTALLATION OF PVC MEMBRANE

- A. Adhered over DensDeck PRIME: Over the properly installed and prepared absorbent substrate, adhesive shall be poured out of the pail and spread using notched squeegees. The adhesive is to be applied at a rate according to Manufacturer's requirements (no adhesive is placed on back of the membrane). The formation of a film on the surface of the adhesive will not be allowed to occur. The membrane is to be carefully unrolled into the wet adhesive while the edges are overlapped 3-inches. The membrane shall be pressed firmly into the adhesive layer with a water-filled, foam-covered lawn roller by frequent rolling in two directions.
 - 1. Adhesive is not to be used if temperatures below 40°F are expected during application or subsequent drying time. No adhesive is to be applied in seam areas. All membrane is to be applied in the same manner.
- B. Securement around perimeter and rooftop penetrations: Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, fasteners and seam plates are to be installed according to perimeter rate of attachment. Fasteners to be installed according to the manufacturer's instructions. Fasteners shall clamp the membrane tightly to the substrate.
 - 1. Membrane flashings to extend 2-1/2-inches past the peel stop and be hot-air welded to the deck membrane.

3.04 HOT-AIR WELDING OF SEAM OVERLAPS

- A. All seams shall be hot-air welded. Seam overlaps should be 3-inches wide when automatic machine-welding and 4-inches wide when hand-welding, except for certain details.
- B. Welding equipment to be provided by, or approved by Manufacturer. All mechanics intending to use the equipment to have successfully completed a training course provided by a Manufacturer's Technical Representative prior to welding.
- C. All membrane to be welded is to be clean and dry.
- D. Hand-welded seams are to be completed in two stages. Hot-air welding equipment to be allowed to warm up for at least one minute prior to welding.
 - 1. The back edge of the seam to be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
 - 2. The nozzle is to be inserted into the seam at a 45-degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2-inch-wide nozzle is recommended for use. For corners and compound connections, the 3/4-inch-wide nozzle shall be used.
- E. Machine Welding
 - 1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, instructions are to be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.

2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

- F. **Quality Control of Welded Seams:** The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Consultant's Field Representative or Manufacturer's representative. One inch wide cross-section samples of welded seams are to be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the City of Beverly Hills.

3.05 MEMBRANE FLASHINGS

- A. All flashings are to be installed concurrently with the roof membrane as the job progresses. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing to be adhered to compatible, dry, smooth, and solvent-resistant surfaces.
- B. **VOC Compliant Adhesive for Membrane Flashings**
1. Over the properly installed and prepared flashing substrate, adhesive is to be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area that can be completely covered in the same day's operations to be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
 2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane to be applied in the same manner, overlapping the edges of the panels as required by welding techniques.
- C. All flashings are to extend a minimum of 8-inches above roofing level unless otherwise accepted in writing by the roofing material manufacturer.
- D. All flashing membranes to be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen to be in contact with the membrane.
- E. Membrane flashings shall be terminated according to recommended detail drawings.
- F. At parapet walls, the single ply roof membrane shall be fully-adhered to acceptable substrate using an approved VOC compliant adhesive. The membrane shall extend up vertical surfaces and terminate along the top of the parapet walls' horizontal plane. The wall flashing assembly shall be installed in accordance with the manufacturer's technical department for additional securement and assembly.

3.06 METAL FLASHINGS

- A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
 2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

- B. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.
- C. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.
- D. Metal joints are to be watertight.
- E. Continuous 22-gauge metal clips are required behind metal fascia when face dimension of metal exceeds 4-inches. Clips are to be fastened 12-inches on-center into the wood nailer or masonry wall. Clips shall extend past wood nailers over wall surfaces by 1-1/2-inch minimum.
- F. Counterflashings shall overlap base flashings at least 4-inches.

3.07 PVC CLAD METAL BASE FLASHINGS/EDGE METAL

- A. All flashings are to be installed concurrently with the roof membrane as the job progresses. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area is to be removed and replaced at the Applicator's expense.
- B. PVC clad metal flashings, where necessary, shall be formed and installed per the detail drawings.
 - 1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4-inches on-center, staggered. Fasteners to penetrate the nailer a minimum of 1-inch.
 - 2. Metal is to be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
- C. Adjacent sheets of clad to be spaced ¼-inch apart. The joint shall be covered with 2-inch wide aluminum tape. A 4-inch minimum wide strip of flashing membrane to be hot-air welded over the joint.

3.08 TEMPORARY CUT-OFF

- A. All flashings are to be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops to be constructed to provide a 100% watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. The waterstop to be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane to be sealed in a continuous heavy application of sealant as described in Section 2.07. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. is to be removed from the work area and properly disposed of offsite. None of these materials are to be used in the new work.
- B. If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.
- C. If any water is allowed to enter under the newly-completed roofing, the affected area is to be removed and replaced at the Applicator's expense.

3.09 COMPLETION

- A. Prior to demobilization from the site, the work is to be reviewed by the Consultant's Field Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Consultant will be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Consultant and Manufacturer prior to demobilization.

End of Section