SECTION 07 54 23

TPO THERMOPLASTIC SINGE-PLY ROOFING

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\*\* NOTE TO SPECIFIER \*\* Carlisle SynTec Systems; Thermoplastic Polyvinyl Chloride (PVC) Membrane Roofing.  
This section is based on the products of Carlisle SynTec Systems, which is located at:  
P. O. Box 7000  
Carlisle, PA 17013  
Toll Free Tel:   
800-4-SYNTEC  
Tel:   
717-245-7000  
Fax:   
717-245-7053  
Email: [request info (Craig.Tyler@CarlisleCCM.com)](https://arcat.com/rfi?action=email&company=Carlisle%252BSynTec%252BSystems&message=RE%253A%2520Spec%2520Question%2520(07545car)%253A%2520&coid=31255&spec=07545car&rep=&fax=%253CBR%253E717-245-7053)  
Web: <https://www.carlislesyntec.com>   
  
 [ [Click Here](https://arcat.com/company/carlisle-syntec-systems-31255) ] for additional information.  
  
Carlisle's more than 40 years of manufacturing experience, over 10 billion square feet of membrane sold and nearly 250,000 warranted installations, positions the company as the single-ply roofing market leader. This role has been achieved through superior customer service and product innovation designed to enhance roof system performance and sustainability. When recently surveyed, architects and specifiers throughout the country, rated Carlisle superior to others for design and technical support and long-term warranties.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. TPO Thermoplastic Single-Ply Roofing.
    2. Membrane Flashings.
    3. Metal Flashings.
    4. Roof Insulation.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 03 51 16 - Gypsum Concrete Roof Decks.
    3. Section 03 52 16 - Lightweight Cellular Insulating Concrete.
    4. Section 05 31 23 - Steel Roof Decking.
    5. Section 06 10 00 - Rough Carpentry.
    6. Section 07 53 23 - Ethylene-Propylene-Diene-Monomer Roofing.
    7. Section 07 54 00 - Thermoplastic Membrane Roofing.
    8. Section 07 62 00 - Sheet Metal Flashing and Trim.
    9. Section 07 70 00 - Roof and Wall Specialties and Accessories.
    10. Section 08 60 00 - Roof Windows and Skylights.
    11. Section 22 30 00 - Plumbing Equipment.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Society of Civil Engineers (ASCE) - ASCE 7 - Minimum Design Loads for Buildings and Other Structures, Current Revision.
    2. ANSI/SPRI WD-1 �Wind Design Standard for Roofing Assemblies�.
    3. ASTM International (ASTM):
       1. ASTM C 208 - Standard Specification for Cellulosic Fiber Insulating Board.
       2. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
       3. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
       4. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
       5. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
       6. ASTM D 312 - Standard Specification for Asphalt Used in Roofing.
       7. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
       8. ASTM D 1079 - Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials.
       9. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
       10. ASTM D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
       11. ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
       12. ASTM D 4869 - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
       13. ASTM D 6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
       14. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

\*\* NOTE TO SPECIFIER \*\* Retain the following Paragraph only if the building is FM Insured. Delete if not required.

* + 1. Factory Mutual (FM Global):
       1. Approval Guide.
          1. Factory Mutual Standard 4470 - Approval Standard for Class 1 Roof Covers.
          2. Loss Prevention Data Sheets 1-28, 1-29.
    2. International Code Council (ICC):
       1. International Building Code (IBC).
    3. National Roofing Contractors Association (NRCA) - Low Slope Roofing and Waterproofing Manual, Current Edition.
    4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.
    5. Underwriters Laboratories (UL):
       1. TGFU R1306 - "Roofing Systems and Materials Guide".
       2. UL-790 - Standard Test Method for Fire Tests of Roof Coverings.
    6. ANSI/ASHRAE/IESNA Standard 9.1 (2007): Energy Standard for Buildings Except Low-Rise Residential Buildings.

\*\* NOTE TO SPECIFIER \*\* Retain only design criteria required for the project and delete those not required or not applicable.

* 1. DESIGN CRITERIA
     1. Wind Uplift Performance:

\*\* NOTE TO SPECIFIER \*\* Select required wind uplift performance criteria. Performance may be specified by referencing ASCE-7, by reference of an FM tested assembly, or both.

* + - 1. Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7.

\*\* NOTE TO SPECIFIER \*\* Insert the appropriate FM rating as found in the current FM Guide. Delete if not insured by FM.

* + - 1. Roof system is designed to achieve a FM 1-\_\_\_ wind uplift rating.

\*\* NOTE TO SPECIFIER \*\* Insert the appropriate DORA Assembly number as found in the current Directory of Roof Assemblies (DORA) by SPRI.

* + - 1. Roof system is designed t achieve a DORA Assembly number \_\_\_ .

\*\* NOTE TO SPECIFIER \*\* Insert the appropriate uplift test results.

* + - 1. Roof system is designed to achieve \_\_\_-psf of uplift testing.
      2. Carlisle offers a standard 55 mph wind speed warranty. Please contact Carlisle if a higher wind speed warranty is desired.
    1. Fire Resistance Performance:

\*\* NOTE TO SPECIFIER \*\* Select fire rating. Delete two of the next three paragraphs.

* + - 1. Roof system will achieve a UL Class A rating when tested in accordance with UL-790.
      2. Roof system will achieve a UL Class B rating when tested in accordance with UL-790.
      3. Roof system will achieve a UL Class C rating when tested in accordance with UL-790.

\*\* NOTE TO SPECIFIER \*\* Insert LTTR Value. Modify R value' to LTTR value' where Polyisocyanurate insulation is not used in the system.

* + 1. Thermal Performance: Roof system will achieve a minimum R value not less than \_\_\_\_.
    2. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.
    3. Building Codes:
       1. Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00.
     2. Product Data: Manufacturer's data sheets on each product to be used, including:
        1. Preparation instructions and recommendations.
        2. Storage and handling requirements and recommendations.
        3. Installation methods.
     3. Detail Drawings:
        1. Submit approved plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the project.
        2. Coordinate approved drawings with locations found on the Contract Drawings.

\*\* NOTE TO SPECIFIER \*\* Delete selection samples if colors have already been selected.

* + 1. Selection Samples: For each finish product specified, two complete sets of chips representing manufacturer's full range of available colors, membranes, and thicknesses.
    2. Verification Samples: For each finish product specified, two samples, minimum size 4 inches (100 mm) square representing actual product, color, and patterns.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty (20) years experience.
     2. Installer Qualifications:
        1. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

\*\* NOTE TO SPECIFIER \*\* retain one of the next two paragraphs only if manufacturer supplied guaranties are specified. Delete if not required.

* + - 1. Installer must be capable of extending the Manufacturer's Labor and Materials guarantee.
      2. Installer must be capable of extending the Manufacturer's No Dollar Limit guarantee.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation, installation techniques and workmanship.
       1. Finish areas designated by Architect.
       2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
       3. Refinish mock-up area as required to produce acceptable work.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Store products in manufacturer's unopened packaging until ready for installation.
     2. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.
     3. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.
     4. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
  2. PROJECT CONDITIONS
     1. Proceed with roofing work only when weather conditions are in compliance with the manufacturer�s recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer�s requirements and recommendations.
     2. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
     3. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
     4. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
     5. New roofing shall be complete and weather tight at the end of the work day.
     6. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.
  3. WARRANTY
     1. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's Total System warranty, outlining its terms, conditions, and exclusions from coverage.

\*\* NOTE TO SPECIFIER \*\* Select Warranty Duration based on specified roof assembly.

\*\* NOTE TO SPECIFIER \*\* 5-year warranty is available for:   
 - Adhered 45-, 60- and 80-mil TPO  
 - Adhered 60- and 80-mil SAT TPO  
 - Mechanically Fastened 45-, 60- and 80-mil TPO  
 - Adhered 100-, 115- and 135-mil TPO FleeceBACK  
 - Hot Mopped 120-, 135- and 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 5 Years.

\*\* NOTE TO SPECIFIER \*\* 10-year warranty is available for:  
 - Adhered 45-, 60-, and 80-mil TPO  
- Adhered 60- and 80-mil SAT TPO  
 - Mechanically Fastened 45-, 60-, and 80-mil TPO  
 - Adhered 100-, 115, and 135--mil TPO FleeceBACK  
 - Hot Mopped 120-, 135-mil and 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 10 Years.

\*\* NOTE TO SPECIFIER \*\* 15-year warranty is only available for:  
 - Adhered 45-, 60-, and 80-mil TPO  
 - Adhered 60- and 80-mil SAT TPO   
 - Mechanically Fastened 45-, 60-, and 80-mil TPO  
 - Adhered 100-, 115 and 135-mil TPO FleeceBACK  
 - Hot Mopped 120-, 135- and 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 15 Years.

\*\* NOTE TO SPECIFIER \*\* 20-year warranty is only available for:  
 - Adhered 60-, and 80-mil TPO  
 - Adhered 60- and 80-mil SAT TPO   
- Mechanically Fastened 60-, and 80-mil TPO  
 - Adhered 115- and 135-mil TPO FleeceBACK  
 - Hot Mopped 135- and 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 20 Years.

\*\* NOTE TO SPECIFIER \*\* 25-year warranty is only available for:  
 - Adhered 80-mil TPO  
 - Adhered 80-mil SAT TPO  
 - Mechanically Fastened 80-mil TPO  
 - Adhered 135-mil TPO FleeceBACK  
 - Hot Mopped 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 25 Years.

\*\* NOTE TO SPECIFIER \*\* 30-year warranty is only available for:   
- Adhered 80-mil TPO  
 - Adhered 80-mil SAT TPO  
 - Mechanically Fastened 80-mil TPO  
 - Adhered 135-mil TPO FleeceBACK  
 - Hot Mopped 155-mil AFX TPO FleeceBACK

* + - 1. Duration: 30 Years.

\*\* NOTE TO SPECIFIER \*\* Delete if not required. Puncture coverage is only available for:  
 - Adhered 80-mil TPO  
 - Adhered 80-mil SAT TPO  
 - Mechanically Fastened 80-mil TPO  
 - Adhered 115- and 135-mil TPO FleeceBACK  
 - Hot Mopped 135- and 155-mil AFX TPO FleeceBACK

* + - 1. Coverage to be extended to include accidental punctures in accordance with terms stated in the Warranty document.

\*\* NOTE TO SPECIFIER \*\* Delete if not required. Hail coverage is only available for:   
 - Adhered 60- and 80-mil TPO  
 - Adhered 60- and 80-mil SAT TPO  
 - Adhered 100-, 115- and 135-mil TPO FleeceBACK  
 - Hot Mopped 120-, 135- and 155-mil AFX TPO FleeceBACK

* + - 1. Coverage to be extended to include hail damage in accordance with terms stated in the Warranty document.
      2. Coverage to be extended to include roof edge metal water tightness in accordance with terms stated in the Warranty document.
    1. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Carlisle SynTec Systems, which is located at: P. O. Box 7000; Carlisle, PA 17013; ASD Toll Free Tel: 800-4-SYNTEC; Tel: 717-245-7000; Fax: 717-245-7053; Email: [request info (info@carlislesyntec.com)](http://admin.arcat.com/users.pl?action=UserEmail&company=Carlisle+SynTec+Systems&coid=31255&rep=&fax=;%20717-245-7053&message=RE:%2520Spec%2520Question%2520(07545car):%2520%2520&mf=); Web: <https://www.carlislesyntec.com>.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.
  1. SCOPE / APPLICATION
     1. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in the Design Criteria article of this section.

\*\* NOTE TO SPECIFIER \*\* Mechanically attached and fully adhered options are for all membranes except Sure-Weld AFX FleeceBACK. Asphalt adhered option is only for Sure-Weld AFX FleeceBACK. Delete all others.

* + - 1. Membrane Attachment: Mechanically Attached.
      2. Membrane Attachment: Fully Adhered.
      3. Membrane Attachment: Asphalt Adhered.
    1. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if insulation beneath the membrane is not specified.

* + 1. Insulation: Provide a roof insulation system beneath the finish membrane.

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if a roof garden assembly is not specified.

* + 1. Roof Garden Assembly:

\*\*NOTE TO SPECIFIER\*\* Select roof Garden assembly type. Delete two of the next three paragraphs.

* + - 1. Provide an Intensive planting system with a soil depth greater than 8 inches (204 mm) with a variety of plants such as sod grass, annual or perennial flowers, shrubs and small trees. Structure must be capable of withstanding the additional dead loads as calculated by the Project Engineer which typically exceed 48 lbs per square foot.
      2. Provide an Extensive planting system with a soil depth of 4 inches to 8 inches (102 to 204 mm) where recommended plants include sedums, herbs, grasses and other vegetation which can grow in this depth of media. Structure must be capable of withstanding the additional dead loads as calculated by the Project Engineer which are typically between 24 to 48 lbs per square foot.
         1. As an alternate to Ultra-Extensive or Extensive traditional, Carlisle Grid System may be used.
      3. Provide an Ultra-Extensive planting system with a soil depth less than 4 inches (102 mm) ideally suited for areas that will receive little maintenance. Recommended plants include sedums, herbs and grasses. Structure must be capable of withstanding the additional dead loads as calculated by the Project Engineer which are typically less than 24 lbs per square foot.

\*\* NOTE TO SPECIFIER \*\* Retain the next article ONLY if membrane is Hot Mopped. Select only base sheet(s) required on the project and delete all others.

* 1. MEMBRANE BASE SHEET
     1. Carlisle FR Base Sheet 1S: A non-asphaltic, resin-bound, fiberglass-reinforced mat, coated on one side with a mineral-filled fire-resistant coating (42" wide and 200' long). Designed for use as a suitable substrate for direct application of Mechanically Fastened Roofing Systems over decks requiring a fastened base sheet.
     2. Carlisle SureMB 70 SA Modified Base Sheet: 70-mil smooth surface, self-adhered base ply. Reinforced with a fiberglass mat that is saturated and coated with asphaltic bitumen and SBS elastomer and meets ASTM D6163 Type 1, Grade S. 70 SA is designed to be used as a base ply or interplay in Carlisle�s multiple-ply system and can be used as an air and vapor barrier or temporary (up to 60 days) roof. Available in 39-3/8" wide and 61' long (200 square feet) weighing 0.39 lbs per square foot.
     3. Carlisle SureMB 90 Modified Base Sheet - 90-mil Glass fiber, reinforced, SBS-modified asphalt, base sheet that meets ASTM D 6163 Type I, Grade S for SBS-modified bituminous sheet materials. May be used as an air barrier, vapor barrier and temporary (Up to 60 days) roof. Available in 39-3/8" wide and 49'-1" long (161 square feet) weighing 0.58 lbs per square foot.
     4. Carlisle SureMB 90TG Base - 94-mil smooth-surfaced, SBS, torch-applied membrane. Reinforced with a fiberglass mat that is saturated and coated with asphaltic bitumen and SBS elastomers which meets ASTM D6163 Type I, Grade S. SureMB 90TG is designed for use as a base-ply or inter-ply in Carlisle's multiple-ply system and can be used as an air barrier, vapor barrier or temporary (Up to 60 days) roof. Available in rolls 39-3/8" wide and 49'-1" long (164 square feet) and weighing 0.57 lbs per square foot.
     5. Carlisle SureMB 120TG Base Sheet - a smooth-surfaced, torch-grade SBS base ply, reinforced with a non-woven polyester mat that is saturated and coated with asphaltic bitumen and SBS elastomers.
     6. VapAir Seal 725TR Air/Vapor Barrier - a 40-mil composite consisting of 35-mils of self-adhering rubberized asphalt laminated to a 5-mil woven polypropylene film.
     7. VapAir Seal MD Air/Vapor Barrier - a reinforced composite aluminum foil with self-adhesive SBS backing and removable poly release film. Used for direct application over metal decks.

\*\* NOTE TO SPECIFIER \*\* Delete the next article if insulation is not required. Retain only insulation type(s) required and delete all others.

* 1. INSULATION
     1. Polyisocyanurate InsulBase: Rigid board with glass fiber reinforced facers (GRF) on both sides, meeting or exceeding the requirements of ASTM C 1289, Type II, Class 1. Carlisle InsulBase.
        1. Compressive Strength: Grade 2, 20 psi (138 kPa).
        2. Compressive Strength: Grade 3, 25 psi (173 kPa).
        3. Density: 2 lb per cubic foot (24 kg/cu m) minimum.
     2. SecurShield Polyiso: Rigid board with coated glass fiber mat facers (CGF) on both sides, meeting or exceeding the requirements of ASTM C 1289, Type II, Class 2.

\*\* NOTE TO SPECIFIER \*\* Select compressive strength. Delete one of the next two paragraphs.

* + - 1. Compressive Strength: Grade 2, 20 psi (138 kPa).
      2. Compressive Strength: Grade 3, 25 psi (173 kPa).
      3. Density: 2 lb per cubic foot (24 kg/cu m) minimum.
    1. Composite Board: Composite insulation panel comprised of 1/2 inch (13 mm) high-density Polyiso board laminated during the manufacturing process to SecurShield rigid Polyiso roof insulation meeting ASTM C1289 Carlisle SecurShield HD Composite.
       1. Top Layer of Lamination: ASTM C1289 Type II, Class 4, Grade 1. Compressive strength 80 psi min (551 kPa).
       2. Bottom Layer of Lamination: ASTM C1289 Type II, Class 2. Compressive strength 20 psi (138 kPa).
    2. Composite Board: Polyisocyanurate foam insulation with GP Dens-Deck gypsum board laminated to one side and glass fiber reinforced facers (GFS)laminated to one side, meeting or exceeding the requirements of ASTM C 1289. Carlisle HP-DD.
       1. Compressive Strength (Polyiso): 20 psi (138 kPa).
       2. Density (Polyiso): 2 lb per cubic foot (24 kg/cu m) minimum.

\*\* NOTE TO SPECIFIER \*\* Select Gypsum Board type. Delete one of the next two paragraphs.

* + - 1. Gypsum Board: Dens-Deck.
      2. Gypsum Board: Dens-Deck Prime.

\*\* NOTE TO SPECIFIER \*\* Select Gypsum Board thickness. Delete two of the next three paragraphs.

* + - 1. Gypsum Board Thickness: 1/4 inch (6 mm).
      2. Gypsum Board Thickness: 1/2 inch (13 mm).
      3. Gypsum Board Thickness: 5/8 inch (16 mm).
    1. Composite Board: Polyisocyanurate foam insulation with 1/2 inch (13 mm) wood fiber roof insulation laminated to one side and glass fiber reinforced facers (GRF) laminated to one side, meeting or exceeding the requirements of ASTM C 1289. Carlisle HP-WF.
       1. Compressive Strength (Polyiso): 20 psi (138 kPa).
       2. Compressive Strength (Wood Fiber): 35 psi (241.5 kPa).
       3. Density (Polyiso): 2 lb per cubic foot (24 kg/cu m) minimum.
    2. Composite Board: Polyisocyanurate foam insulation with 7/16 inch (11 mm) Oriented Strand Board (OSB) laminated to one side and glass fiber reinforced facers (GRF) laminated to one side, meeting or exceeding the requirements of ASTM C 1289. Carlisle StormBase composite.
       1. Oriented Strand Board: 7/16 inch (11 mm) thick.
       2. Compressive Strength (Polyiso): 20 psi (138 kPa).
       3. Density (Polyiso): 2 lb per cubic foot (24 kg/cu m) minimum.
    3. Expanded Polystyrene (EPS): Rigid, closed cell foam insulation meeting ASTM C 578. Carlisle Sure-Seal.

\*\* NOTE TO SPECIFIER \*\* Select Compressive strength based on insulation type. Delete two of the next three paragraphs. Must be overlaid with a cover board.

* + - 1. Density: 1 Lb min.
      2. Density: 1.25 Lb min.
      3. Density: 1.5 Lb min.
    1. Extruded Polystyrene (XPS): Rigid, closed-cell structured thermal barrier meeting ASTM C 578. Foamular, distributed by Carlisle.

\*\* NOTE TO SPECIFIER \*\* Select insulation type. Delete three of the next four paragraphs.

* + - 1. Foamular 250 Compressive Strength - 25 psi (1.75 kg/sq.cm.) minimum.
      2. Foamular 400: Compressive Strength - 40 psi (2.8 kg/sq.cm.) minimum.
      3. Foamular 600: Compressive Strength - 60 psi (4.2 kg/sq.cm.) minimum.
      4. Foamular 1000: Compressive Strength - 100 psi (7.03kg/sq.cm.) minimum.
    1. Extruded Polystyrene (XPS): Rigid, closed-cell recovery board meeting ASTM C 578. Foamular Durapink, distributed by Carlisle.

\*\* NOTE TO SPECIFIER \*\* Select insulation type. Delete two of the next three paragraphs.

* + - 1. 1 inch (25 mm): Compressive Strength - 25 psi (1.75 kg/sq.cm.) minimum.
      2. 3/4 inch (19 mm): Compressive Strength - 25 psi (1.75 kg/sq.cm.) minimum.
      3. 1/2 inch (13 mm): Compressive Strength - 18 psi (1.27 kg/sq.cm.) minimum.
    1. Extruded Polystyrene (XPS): Rigid, closed-cell structured thermal barrier meeting ASTM C 578. Dow Styrofoam, distributed by Carlisle.

\*\* NOTE TO SPECIFIER \*\* Select insulation type based on project requirements. Delete three of the next four paragraphs.

* + - 1. Deckmate: Compressive Strength - 18 psi (1.27 kg/sq.cm.) minimum.
      2. Deckmate Plus: Compressive Strength - 25 psi (1.75 kg/sq.cm.) minimum.
      3. Roofmate: Compressive Strength - 40 psi (2.8 kg/sq.cm.) minimum.
      4. Plazamate: Compressive Strength - 60 psi (4.2 kg/sq.cm.) minimum.
    1. Water-resistant and silicone treated gypsum panel with embedded fiberglass facer on both sides, and pre-primed on one side. GP Gypsum Dens-Deck Prime, distributed by Carlisle.

\*\* NOTE TO SPECIFIER \*\* Select thickness. Delete three of the next four paragraphs.

* + - 1. Board Thickness: 1/4 inch (6 mm).
      2. Board Thickness: 3/8 inch (10 mm).
      3. Board Thickness: 1/2 inch (13 mm).
      4. Board Thickness: 5/8 inch (15 mm).
    1. Moisture, mold and impact-resistant, non-structural fiber-reinforced gypsum panel made from 95 percent recycled materials. Securock, distributed by Carlisle.

\*\* NOTE TO SPECIFIER \*\* Select thickness. Delete three of the next four paragraphs.

* + - 1. Board Thickness: 1/4 inch (6 mm).
      2. Board Thickness: 3/8 inch (10 mm).
      3. Board Thickness: 1/2 inch (13 mm).
      4. Board Thickness: 5/8 inch (15 mm).
    1. SecurShield HD Polyiso Cover board: Rigid board with coated glass fiber mat facers (CGF) on both sides, meeting or exceeding the requirements of ASTM C 1289, Type II, Class 4, Grade 1.
       1. Compressive Strength: 80 psi min. (551 kPa).
       2. Board Thickness: 1/2 inch (13 mm).
    2. SecurShield HD Plus Polyiso Cover board: Rigid board with coated glass fiber mat (CGF) facers on both sides, meeting or exceeding the requirements of ASTM C 1289, Type II, Class 4, Grade 1. Designed for higher uplift with fewer fasteners per board.
       1. Compressive Strength: 80 psi min. (551 kPa).
       2. Board Thickness: 1/2 inch (13 mm).

\*\* NOTE TO SPECIFIER \*\* Delete the entire next article if insulation adhesive is not required.

* 1. INSULATION ADHESIVE
     1. Flexible FAST Adhesive: A spray or extruded applied, two-component polyurethane, low-rise expanding foam adhesive used for attaching approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or existing smooth or gravel surfaced BUR, modified bitumen or cap sheets.
     2. Flexible FAST Dual Cartridge Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.
     3. Flexible FAST Dual Tank Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.
     4. Flexible FAST 5-gallon Jug Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates, packaged for use with low pressure urethane equipment.
     5. OlyBond 500 BA - A two-component, polyurethane, low-rise expanding adhesive used to bond insulation to various substrates using a mechanical dispenser system.
     6. OlyBond Spot Shot - A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.
     7. One-Step: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates using a portable applicator.
  2. THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE

\*\* NOTE TO SPECIFIER \*\* Select membrane type(s) required on the project from the next three options, and delete all others not required. Modify the included text as instructed.

* + 1. Sure-Weld Membrane:

\*\* NOTE TO SPECIFIER \*\* Select Membrane Color. Insert custom color where specified from manufacturers preselected 16 color listings. 100,000 sf minimum. Delete three of the next four paragraphs.

* + - 1. Color: White.
      2. Color: Gray.
      3. Color: Tan.
      4. Special Color: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Select membrane thickness. Delete one of the next two paragraphs.

* + - 1. Membrane Thickness: 45 mil nominal.
         1. Thickness over Scrim: 0.015 inches (0.38 mm).
         2. Breaking Strength (ASTM D 751): 225 lbf/in (1 kN/m) minimum.
         3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         4. Elongation (ASTM D 751): 25 percent.
      2. Membrane Thickness: 60 mil nominal.
         1. Thickness over Scrim: 0.020 inches (0.508 mm).
         2. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
         3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         4. Elongation (ASTM D 751): 25 percent.
      3. Field Sheet Dimensions:

\*\* NOTE TO SPECIFIER \*\* Select maximum field sheet width. Delete three of the next four paragraphs.

* + - * 1. Width: 6 feet (1.8 m) maximum.
        2. Width: 8 feet (2.4 m) maximum.
        3. Width: 10 feet (3.05 m) maximum.
        4. Width: 12 feet (3.65 m) maximum.
        5. Length: 100 feet (30.5 m) maximum.
    1. Sure-Weld EXTRA Membrane:

\*\* NOTE TO SPECIFIER \*\* Select Membrane Color. Insert custom color where specified from manufacturers preselected 16 color listings. 100,000 sf minimum. Delete three of the next four paragraphs.

* + - 1. Color: White.
      2. Color: Gray.
      3. Color: Tan.
      4. Special Color: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
      5. Membrane Thickness: 80 mil nominal.
         1. Thickness over Scrim: 0.034 inches (0.86 mm) +/-10 percent.
         2. Breaking Strength (ASTM D 751): 350 lbf/in (1.6 kN/m) minimum.
         3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         4. Elongation (ASTM D 751): 25 percent.
      6. Field Sheet Dimensions:

\*\* NOTE TO SPECIFIER \*\* Select maximum field sheet width. Delete three of the next four paragraphs.

* + - * 1. Width: 6 feet (1.8 m) maximum.
        2. Width: 8 feet (2.4 m) maximum.
        3. Width: 10 feet (3.05 m) maximum.
        4. Width: 12 feet (3.65 m) maximum.
        5. Length: 100 feet (30.5 m) maximum.
    1. Sure-Weld SAT Membrane: TPO membrane laminated to an elastomeric pressure-sensitive adhesive.

\*\* NOTE TO SPECIFIER \*\* Delete color options not required.

* + - 1. Color: White.
      2. Color: Gray.
      3. Color: Tan.

\*\* NOTE TO SPECIFIER \*\* Select membrane thickness. Delete one of the next two paragraphs.

* + - 1. Membrane Thickness: 60 mil nominal.
         1. Thickness over Scrim: 0.020 inches (0.508 mm).
         2. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
         3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         4. Elongation (ASTM D 751): 25 percent.
      2. Membrane Thickness: 80 mil nominal.
         1. Thickness over Scrim: 0.034 inches (0.86 mm) +/-10 percent.
         2. Breaking Strength (ASTM D 751): 350 lbf/in (1.6 kN/m) minimum.
         3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         4. Elongation (ASTM D 751): 25 percent.
      3. Field Sheet Dimensions:
         1. Width: 10 feet (3.05 m) maximum.
         2. Length: 100 feet (30.5 m) maximum.
    1. Sure-Weld APEEL TPO Membrane: TPO membrane laminated to a protective film to protect the membrane during installation from scuffs and dirt accumulation
       1. Color: White.
       2. Color: Tan.
       3. Color: Gray.
       4. Membrane Thickness: 60 mil nominal.
          1. Thickness over Scrim: 0.020 inches (0.508 mm).
          2. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
          3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
          4. Elongation (ASTM D 751): 25 percent.
       5. Membrane Thickness: 80 mil nominal.
          1. Thickness over Scrim: 0.034 inches (0.86 mm) +/-10 percent.
          2. Breaking Strength (ASTM D 751): 350 lbf/in (1.6 kN/m) minimum.
          3. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
          4. Elongation (ASTM D 751): 25 percent.
       6. Field Sheet Dimensions:
          1. Width: 6 feet (1.8 m) maximum.
          2. Width: 8 feet (2.4 m) maximum.
          3. Width: 10 feet (3.05 m) maximum.
          4. Width: 12 feet (3.65 m) maximum.
          5. Length: 100 feet (30.5 m) maximum.
    2. Sure-Weld FleeceBACK Membrane: TPO membrane with a 55-mil fleece bonded to the underside.

\*\* NOTE TO SPECIFIER \*\* Select Membrane Color. Insert custom color where specified from manufacturers preselected 16 color listings. 100,000 sf minimum. Delete three of the next four paragraphs.

* + - 1. Color: White.
      2. Color: Gray.
      3. Color: Tan.
      4. Special Color: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Select membrane thickness. Delete one of the next two paragraphs.

* + - 1. Membrane Thickness: 100 mil nominal / 45 mil over fleece.
      2. Membrane Thickness: 115 mil nominal / 60 mil over fleece.
      3. Membrane Thickness: 135 mil nominal / 80 mil over fleece.
      4. Sheet Dimensions:
         1. Width: 12 feet (3.66 m) maximum.
         2. Length: 75 feet (22.86 m) maximum, for 135-mil membrane.
         3. Length: 100 feet (30.5 m) maximum.
      5. Performance:
         1. Breaking Strength: FB 100 - 300 lbf (1.3 kN) minimum / FB 115 - 400 (1.8 kN) minimum.
         2. Tear Strength: 55 lbf/in (245 N/m ) minimum.
         3. Elongation: 25 percent.
    1. Sure-Weld AFX FleeceBACK Membrane:
       1. Color: White.

\*\* NOTE TO SPECIFIER \*\* Select membrane thickness. Delete one of the next two paragraphs.

* + - 1. Membrane Thickness: 120 mil nominal / 45 mil over fleece.
         1. Breaking Strength (ASTM D 751): 225 lbf/in (1 kN/m) minimum.
         2. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         3. Elongation (ASTM D 751): 25 percent.
      2. Membrane Thickness: 135 mil nominal / 60 mil over fleece.
         1. Breaking Strength (ASTM D 751): 225 lbf/in (1.1 kN/m) minimum.
         2. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
         3. Elongation (ASTM D 751): 25 percent.
      3. Field Sheet Dimensions:
         1. Width: 12 feet (3.65 m) maximum.
         2. Length: 75 feet (22.86 m) maximum.

\*\*NOTE TO SPECIFIER\*\* Where known, retain only accessories required on this project. If not known, retain all included paragraphs.

* 1. FLASHING ACCESSORIES
     1. Inside Corners: Pre-molded corner flashing for inside corners. 60 mil thickness. Color to match membrane. Special colors require custom fabrication process.
     2. Outside Corners: Injection molded corner used for flashing outside corners. 60 mil thickness. Color to match membrane. Special colors require custom fabrication process.

\*\* NOTE TO SPECIFIER \*\* TPO T-Joint Covers are mandatory on all 60, 72, and 80 mil TPO systems and on 45 mil systems where step-offs have not been properly sealed.

* + 1. TPO T-Joint Covers: Injection molded 60 mil thick TPO formed into a 4.5 inch (114 mm) diameter circle used to seal step-offs at splice intersections. Color to match membrane. Special colors require custom fabrication process.
    2. TPO Curb Wrap Corners: Pre-fabricated corner flashings made from 60 mil thick reinforced Sure-Weld membrane. 6 inch (152 mm) wide base flange and a 12 inch (305 mm) overall height. Sizes available to fit curbs up to 6 foot by 6 foot (1828 x 1828 mm) in size. Color to match membrane. Gray, tan and special colors require custom fabrication process.
    3. TPO Universal Corners: A pre-molded flashing for use in a variety of corner details, including inside and outside corners. Available in white, gray and tan and are 60-mil thick.
    4. Molded Pipe Seals: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 0.75 inch to 8 inch (19 - 203.2 mm) diameter pipes. Color to match membrane. Special colors not available.
    5. TPO Split Pipe Seals: Pre-fabricated flashing consisting of 60 mil thick reinforced Detail Membrane for pipes 1 inch to 6 inch (25.4 - 152.4 mm) in diameter. A split (cut) and overlapped tab is incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration. Gray, tan and special colors require custom order fabrication. Custom sizes available on a special order basis.
    6. TPO Split Square Tubing Wraps: Pre-fabricated flashings made of 60 mil thick reinforced Detail membrane for square tubing. A split (cut) and overlap tab are incorporated into these parts to allow the seals to be opened and wrapped around a square tubing penetration with an obstruction. Stock sizes include 3- inch, 4-inch, 5-inch and 6 inch (76, 102, 127, 152 mm) diameter square tubing. Gray, tan and special colors require custom order fabrication. Custom sizes available on a special order basis.
    7. TPO Molded Sealant Pockets:
       1. A two-piece, interlocking injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Color to match membrane. Special colors not available.
       2. Used with Thermoplastic One-Part Pourable Sealer as specified in this section for waterproofing pipe clusters or other odd shaped penetrations. The removable built-in extension legs allow the oval pocket to adjust from 7.5 inches to 11.5 inches (191mm - 292 mm) in length while maintaining a 6-inch width (152 mm).
    8. Pre-Fabricated Sealant Pockets: A two-piece, pre-fabricated, custom sized, sealant pocket that utilizes reinforced TPO membrane and coated metal to form a rigid, oversized sealant pocket with a weldable horizontal deck flange. Color - White. Gray, tan and special colors require custom order fabrication.
    9. Sealant Pocket Extension Legs: Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10 inches (254 mm). Fabricated from 45 mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Color - White. Gray, tan and special colors require custom order fabrication.
    10. Pressure-Sensitive Cover Strip: A nominal 6 inch (152 mm) wide by 40 mil thick non-reinforced TPO membrane laminated to nominal 35-mil thick cured synthetic rubber pressure-sensitive adhesive. Used in conjunction with TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Color to match membrane. Special colors not available.
    11. TPO Pressure-Sensitive RUSS:

\*\* NOTE TO SPECIFIER \*\* Select RUSS Strip Size. Delete one of the next two paragraphs.

* + - 1. 6 inch (152 mm) RUSS: A nominal 6 inch (152 mm) wide, 45 mil thick reinforced TPO membrane with nominal 3 inch (76 mm) wide 35mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end. This product allows a continuous piece of membrane to be run up a parapet wall without fastener penetration through the field sheet at angle changes.
      2. 10 inch (254 mm) RUSS: A nominal 10 inch (254 mm) wide, 45 mil thick reinforced TPO membrane with nominal 3 inch (76 mm) wide 35mil thick cured synthetic rubber pressure-sensitive adhesive laminated along both ends. The TPO 10-inch RUSS is used in place of narrow sheets to secure membrane in the perimeter roof area. The use of this product allows field membrane to be utilized over the entire roof area.
    1. Sure-Weld Heat Weldable Walkway Rolls: Superior tear, puncture and weather resistance and designed to protect Sure-Weld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to Sure-Weld membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 34 inches (864 mm) wide by 50 feet (15.2 m) long and are nominal 180 mils thick. Color - White, gray and tan.
    2. Sure-Weld TPO Crossgrip Walkway Rolls: Manufactured from TPO and may be used in lieu of standard Sure-Weld TPO Walkway Rolls when a walkway is to be loose-laid and not secured to the membrane. Loose-laid Crossgrip TPO Walkway Rolls are effective for winds up to 55 mph. Rolls are 36� wide by 33� long, available in white, gray and yellow.
    3. Non-Reinforced Flashing: Non-reinforced TPO flashing is a 60-mil thick non-reinforced TPO based membrane used for detail work where the use of pre-molded or pre-fabricated accessories are not feasible. Color - White, gray and tan. Special colors require lead time and 5,000 square foot minimum.
    4. Sure-Weld TPO Contour Rib Profile: Used to obtain the appearance of standing seam metal roofing with the performance of a TPO single-ply membrane. The Contour Rib Profile measures 1-1/4 inches tall and 2-1/8 inches wide, including the welding flanges, while the vertical profile is a substantial 3/8 inch thick. The profile has a continuous 1/8 inch diameter alignment hole, for use with fiberglass connecting pins, as well as a 1/8 inch fiberglass reinforcing cord for added strength. The Contour Rib Profile is available in white, gray and tan, 10 foot lengths and packaged 20 per carton.

\*\* NOTE TO SPECIFIER \*\* Retain only products required on this project and delete all others.

* 1. CLEANERS, PRIMERS, ADHESIVES AND SEALANTS
     1. Sure-Weld Bonding Adhesive: A high-strength solvent-based contact adhesive used for bonding Sure-Weld membrane to various porous and non-porous substrates.
        1. Base: Synthetic Rubber.
        2. Color: Yellow.
        3. Solids: 20.0 percent.
        4. VOC: 670 grams/liter.
     2. Low VOC Bonding Adhesive: A high strength, solvent-based contact adhesive that allows bonding of Sure-Weld membrane to various porous and non-porous substrates. It is specially formulated using a blend of VOC exempt and non-exempt solvents to be in compliance with the state of California Clean Air Act of 1988 (updated in 1997) and as further regulated by California's Air Quality Control Districts listing VOC grams per liter limitations.
        1. Base: Synthetic Rubber.
        2. Color: Yellow.
        3. Solids: 20.3 percent.
        4. VOC: 250 grams/liter.
     3. Flexible FAST Adhesive: A spray or extruded applied, two-component, polyurethane, low-rise expanding foam adhesive used to securely bond FleeceBACK membranes to a variety of substrates.
     4. Flexible FAST Dual Cartridge Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive used to securely bond FleeceBACK membranes to a variety of substrates. The adhesive is extrusion applied 4 inch (102 mm), 6 inch (152 mm) or 12 inch (305 mm) on center (depending on project conditions) using a portable applicator.
     5. Flexible FAST Dual Tank Adhesive: A spray applied, two-component, polyurethane construction grade, low-rise expanding adhesive used to securely bond FleeceBACK membranes to a variety of substrates.
     6. Flexible FAST 5-gallon Jug Adhesive: A two-component, polyurethane construction grade, low-rise expanding adhesive designed for bonding insulation to various substrates, packaged for use with the spray application rigs.
     7. Aqua Base 120 Bonding Adhesive: A semi pressure-sensitive water based adhesive. Used as a one-sided, wet lay-in adhesive with Sure-Weld FleeceBACK 100 or 115 mil membranes or as a two-sided contact adhesive with non-fleece backed Sure-Weld TPO membranes.
     8. CAV-GRIP III Low-VOC Aerosol Contact Adhesive/Primer: A low-VOC, methylene chloride-free adhesive that can be used for a variety of applications including: Bonding Sure-Weld membrane to various surfaces, priming unexposed asphalt prior to applying Flexible FAST Adhesive, adhering Sure-Weld TPO membrane, horizontally, for the field of the roof, and for adhering Sure-Weld FleeceBACK and Sure-Weld TPO membrane to vertical walls. Coverage rate is approximately 2,000-2,500 sq. ft. per 40 lb cylinder and 4,000-5,000 sq. ft. per 85 lb cylinder as a primer, in a single-sided application; 750 sq. ft. per 40 lb cylinder and 1,500 sq. ft. per 85 lb cylinder as an adhesive for vertical walls, in a double-sided application; 1,000 sq. ft. per 40 lb cylinder and 2,000 sq. ft. per 85 lb cylinder as an adhesive, horizontally, for the field of the roof, in a double-sided application.
     9. Cut Edge Sealant: A medium solids content, free flowing polymeric material designed for sealing cut edges (exposed fabric) of Sure-Weld reinforced membrane.
     10. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.
     11. Low VOC Primer: Manufacturer�s recommended low VOC primer.
     12. TPO Primer: Solvent-based product designed to prepare TPO membrane for improved adhesion to TPO surfaces prior to the application of pressure-sensitive products and sealant pockets.
     13. Universal Single-Ply Sealant: A 100 percent solids, solvent free, VOC free, one-part polyether sealant that provides a weather tight seal to a variety of building materials. It is used for general caulking such as above termination bars and metal counter flashings and at scupper details.. Available in white only.
     14. Thermoplastic One-Part Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with Carlisle's Thermoplastic membranes. Provides a flexible, durable and long lasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.
     15. Carlisle Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.
     16. CCW 702 Primer and 702LV Primer (Low VOC) - A single component, solvent based, high-tack primer used to provide maximum adhesion between Carlisle 725TR Air and Vapor Barrier and an approved substrate. Applied by spray or long nap roller with a coverage rating ranging from approximately 300 to 350 square feet per gallon on smooth finishes (i.e., concrete) to 75 square feet per gallon on porous surfaces (i.e., Dens-Deck Prime gypsum board). Available in 5-gallon containers. CCW 702LV Primer contains less than 250g/L VOCs and meets South Coast Air Quality Management District (SCAQMD) and Leadership in Energy and Environmental Design (LEED) Requirements for Volatile Organic Compounds.
     17. CCW 702 WB - A high-tack, water-based contact adhesive for promoting adhesion of Carlisle air/vapor barrier membranes and an approved substrate (i.e., concrete, Dens-Deck Prime and Securock). Applied by roller, brush or spray with an application rate of approximately 200 sq. ft. per gallon. Available in 5-gallon containers. CCW 702 WB Primer contains 57g/L VOCs and meets South Coast Air Quality Management District (SCAQMD) and Leadership in Energy and Environmental Design (LEED) Requirements for Volatile Organic Compounds.

\*\* NOTE TO SPECIFIER \*\* Retain the next article only if Sure Weld FleeceBACK Hot Mopped System is specified or insulation is asphalt adhered.

* 1. BITUMEN
     1. Hot Asphalt: Meets or exceeds requirements of ASTM D 312:

\*\* NOTE TO SPECIFIER \*\* Select required asphalt type. Delete two of the next three paragraphs.

* + - 1. Type: III.
      2. Type: IV.
      3. Type: SEBS.
    1. Cut-Back Asphalt Primer: ASTM D 41 primer for structural concrete decks, existing smooth BUR, mineral surfaced cap sheet, or modified bitumen membranes prior to mopping.
  1. FASTENING COMPONENTS

\*\* NOTE TO SPECIFIER \*\* Retain only fasteners required on this project and delete all others.

* + 1. HP Fastener: Threaded, coated (E-Coat) fastener for use with steel, wood plank or oriented strand board (OSB). For insulation fastening only on TPO Mechanically Fastened Roofing Systems.
    2. HP-X Fasteners: Heavy-duty #15 threaded fastener with a Phillips head for standard TPO seam fastening (Mechanically Fastened Roofing Systems) and where increased pullout resistance is necessary for steel and wood decks (Fully Adhered Roofing Systems).
    3. HP-Xtra Fasteners: An oversized diameter #21 steel threaded fastener used with HP Extra Polymer Seam Plates for membrane securement on Mechanically Fastened Roofing Systems.
    4. HD 14-10 Concrete Fastener: A #14 threaded fastener used for minimum 3,000 psi concrete decks.
    5. CD-10 Concrete Fastener: A hammer-driven, non-threaded E-Coat fastener for use with structural concrete decks rated 3,000 psi or greater.
    6. InsulFast Fasteners: Threaded, #12 fastener with a #3 Phillips head used with 3 inch (76 mm) diameter Insulation Plates. For insulation attachment into steel or wood decks.
    7. Pre-Assembled ASAP Fasteners: InsulFast Fastener and pre-assembled 3 inch (76 mm) diameter Plastic Insulation Plate for insulation attachment on adhered and mechanically-fastened roofing systems.
    8. HP-NTB Fastener: A non-penetrating, plastic fastener and plate for cementitious wood fiber and gypsum.
    9. Lite-Deck Fastener: An oversized diameter metal fastener and associated 3 inch diameter Lite-Deck metal plate for use on adhered roofing systems to attach insulation to dense gypsum decks, cementitious wood fiber and lightweight insulating concrete.
    10. HP Term Bar Nail-In: A 1 1/4 inch (32 mm) long expansion anchor with threaded drive pin used for fastening Termination Bar or Seam Fastening Plates to concrete, brick or block walls.
    11. Base Sheet Fasteners And Plates:
        1. Carlisle Dual-Prong Fastener - A factory pre-assembled, 1.8 inch (46 mm) long fastener consisting of a precision tube formed from galvanized (G-90) coated steel, a 2.7 inch (69 mm) diameter disk formed from Galvalume (AX-55) coated steel and a locking staple of high tensile steel wire used to secure base sheets to fibrous cement, lightweight concrete and gypsum providing 70 lbs. of pullout resistance is achieved (40 lbs. Min.).
        2. Carlisle Metal Cap: For use on projects limited in height 30 feet (9.14 M) or 40 feet (12.2 M) depending on base sheet used, 1 inch (25 mm) Carlisle Metal Cap in conjunction with a ring shank nail may be use to attach base sheets to wood plank, plywood or OSB decks per Carlisle's approved fastening pattern.
        3. Base Sheet fasteners and plates by others must be FM approved and the respective manufacturers' published recommendations for proper installation must be followed.

\*\* NOTE TO SPECIFIER \*\* Retain only fastening plates required on this project and delete all others.

* + 1. Piranha Plates: A 2 3/8 inch (60 mm) diameter metal barbed fastening plate used with Carlisle HP-X, CD-10 or HD 14-10 Fasteners for membrane securement. This plate can be used for insulation securement.
    2. Piranha-Xtra Plates: A 2 3/8 inch (60 mm) diameter metal barbed fastening plate with an oversized hole for use with Carlisle HP-Xtra Fasteners for membrane securement.
    3. Seam Fastening Plates: A 2 inch (52 mm) diameter metal plate used for insulation attachment on Mechanically Fastened Roofing Systems or membrane securement on Adhered Roofing Systems in conjunction with the appropriate Carlisle Fastener. Not for use on Sure-Weld systems.
    4. Insulation Fastening Plates: A nominal 3 inch (76 mm) diameter metal plate used for insulation attachment in conjunction with the appropriate Carlisle Fastener.
  1. EDGINGS AND TERMINATIONS
     1. SecurEdge 200: A snap-on edge system consisting of a 24 gauge galvanized metal water dam. Finish as noted on the Finish Schedule of the Contract Drawings.
     2. SecurEdge 300: A 24 gauge galvanized metal water dam. Finish as noted on the Finish Schedule of the Contract Drawings.
     3. SecurEdge 400: A 24 gauge galvanized metal water dam. Finish as noted on the Finish Schedule of the Contract Drawings.
     4. SecurEdge 2000: An anchor bar roof edge fascia system consisting of 0.100 inch (2.5 mm) thick extruded aluminum bar, corrosion resistant stainless steel fasteners and snap-on fascia cover.
     5. SecurEdge 3000: A metal anchor bar fascia system consisting of a 20 gauge steel retainer bar, corrosion resistant fasteners and aluminum or 24 gauge steel snap-on fascia cover.
     6. SecurEdge 4000: A metal anchor bar fascia system consisting of a 20 gauge steel retainer bar, corrosion resistant fasteners and aluminum or 24 gauge steel snap-on fascia cover.
     7. Sure-Seal Drip Edge: A 22 gauge pre-punched 90-degree angle cleat and 12 foot (3658 mm) long fascia sections. Kynar 500 or aluminum finish as noted on the Finish Schedule of the Contract Drawings.
     8. SecurEdge 200 Coping: An anchor cleat with pre-slotted holes, a concealed joint cover, and 10 or 12 foot sections of coping cap. Kynar 500 finish as noted on the Finish Schedule of the Contract Drawings.
     9. SecurEdge 300 Coping: An anchor cleat with pre-slotted holes, a concealed joint cover, and 10 or 12 foot sections of coping cap. Kynar 500 finish as noted on the Finish Schedule of the Contract Drawings.
     10. SecurEdge 400 Coping: An anchor cleat with pre-slotted holes, a concealed joint cover, and 10 or 12 foot sections of coping cap. Kynar 500 finish as noted on the Finish Schedule of the Contract Drawings.
     11. Sure-Seal Ballast Retaining Bar: A ballast retaining perimeter securement system comprised of a slotted extruded aluminum retention bar with integrated compression fastening strip.
     12. Sure-Seal Termination Bar: 1 inch (13 mm) wide, .098 inch (2.5 mm) thick extruded aluminum bar pre-punched 6 inches (152 mm) on center with sealant ledge to support Lap Sealant.
     13. SecurEdge Term Bar Fascia: A 1.75" wide formed aluminum termination bar with pre-slotted fastening holes for ease of locating and installing. The decorative cover is available in 0.040" aluminum or 24-gauge galvanized steel. SecurEdge Term Bar Fascia is manufactured in 12' lengths for fewer joints/seams, fewer sections to handle and faster installation.

\*\* NOTE TO SPECIFIER \*\* Delete the next article if roof garden is not specified. Retain only products required on this project.

* 1. ROOF GARDEN COMPONENTS

\*\* NOTE TO SPECIFIER \*\* Select required drainage board. Delete one of the next two paragraphs.

* + 1. Drainage Components:
       1. Carlisle's MiraDRAIN 9800 Drainage Board: High impact polystyrene core with "cups" and pierced holes allowing water retention and drainage. A non-woven polypropylene filter fabric is bonded to the retention side of the molded core to prevent passage of particles into the water reservoirs. Designed to retain water in Ultra-Extensive and Extensive Roof Gardens while allowing excess water to the drainage system. Installed over CCW 200V or 300HV protection fabric.
          1. Panel Thickness: 0.4 inches (1.02 mm).
          2. Water Flow Rate: 95 gpm/ sqft in accordance with ASTM D 4491.
       2. MiraDRAIN G4 Roof Garden Drainage Composite: Filter fabric, moisture retention mat, drainage mat, and heavy duty protection fabric combined into a single, component specifically designed for vegetated roofs.
          1. Panel Thickness: 1.21 inches (30.1 mm).
          2. Water Flow Rate: 75 gpm/sf in accordance with ASTM D 4491.
    2. Protective Mats:

\*\* NOTE TO SPECIFIER \*\* Retain only components required on this project and Delete all others.

* + - 1. Protection Fabric: Carlisle CCW 200V - 12 oz/sq yd needle punched, non-biodegradable, non-woven polypropylene fabric stabilized to resist soil chemicals, mildew and insects, for use in conjunction with Green Grid Trays only.
      2. Protection Fabric: Carlisle 300HV - 16 oz/sq yd needle punched, non-biodegradable, non-woven polypropylene fabric stabilized to resist soil chemicals, mildew and insects.
      3. Root Barrier: 40 mil non-reinforced polypropylene geomembrane sheet specifically formulated for use in below grade applications to resist root growth and soil bacteria. Used in Intensive (deep) and Extensive (medium depth) Roof Garden Systems.
      4. Biobarrier: A water and air permeable non-woven root barrier designed to inhibit the growth of plants roots through low-level emission of synthesized plant hormones.
    1. Hardscape:

\*\* NOTE TO SPECIFIER \*\* Retain only components required on this project and Delete all others.

* + - 1. Individual Concrete Plaza Pavers - 2 foot by 2 foot by 2 inches thick (610 x 610 x 51 mm) precast concrete pavers weighing a minimum of 18 psf with a minimum compressive strength of 6500 psi.
      2. Paver Pedestals: Rubber paver pedestals to elevate the surface of the pavers above the roof membrane and promote positive drainage and protection from freeze/thaw.
      3. Stone Ballast: Nominal 1 1/2 inch (39 mm) diameter rounded water worn gravel which conforms with ASTM D 448, gradation size #4, applied at a minimum of 10 pounds per square foot.
      4. Other: All Roof Garden products not specified in this section such as concrete curbs, landscape lumber or other desired landscape products used to transition between Ultra-Extensive, Extensive and Intensive Roof Garden areas to act as a "growth media stop" must be approved specifically by the Architect prior to installation.
    1. Greenscape:
       1. Growing Medium: A mixture of mineral and organic soil components as selected by the landscape architect/designer or other appropriate landscape professional for the intended vegetation and climate.
    2. Vegetation:
       1. Sedum Tile: Fully pre-vegetated coconut fiber mat designed to provide immediate full vegetative coverage.
       2. Sedum Clippings and Gel: Un-rooted sedum cuttings dispersed on the surface of growth media in conjunction with a water retention gel to aid in the plant rooting process.
       3. Plugs: Plants are pre-grown into soil �plugs� to be inserted into the surface of the growth media. Typically delivered in 10� x 20� trays containing 24 - 72 individual plants.

1. EXECUTION
   1. EXAMINATION
      1. Do not begin installation until substrates have been properly prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
   2. PREPARATION
      1. Clean surfaces thoroughly prior to installation.
      2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
      3. Do not commence work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.
      4. A vapor retarder / temporary roof (Carlisle VapAir Seal 725 TR Air and Vapor Barrier/Temporary Roof or Carlisle VapAir Seal MD Air and Vapor Barrier) may be applied to protect the inside of the structure prior to the roof system installation.

\*\* NOTE TO SPECIFIER \*\* Insert project specific information regarding insulation types and attachment. Add or remove layers as necessary, or delete the entire article if not required.

* 1. INSULATION - SYSTEM DESIGN
     1. Base Layer:
        1. Type: \_\_\_\_\_\_\_\_\_\_\_\_.
        2. Thickness: \_\_\_\_\_\_ inches (\_\_\_ mm).
        3. Attachment Method: \_\_\_\_\_.
     2. Top Layer:
        1. Type: \_\_\_\_\_\_\_\_\_\_\_\_.
        2. Thickness: \_\_\_\_\_\_ inches (\_\_\_ mm).
        3. Attachment Method: \_\_\_\_\_.
     3. Tapered System:
        1. Type: \_\_\_\_\_\_\_\_\_\_\_\_.
        2. Field Slope: \_\_\_\_ inch per foot.
        3. Sump Slope: \_\_\_\_ inch per foot.
        4. Cricket Slope: \_\_\_\_ inch per foot.
        5. Attachment Method: \_\_\_\_\_.
  2. INSULATION PLACEMENT
     1. Install insulation or membrane underlayment in multiple layers over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
     2. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.
     3. Do not install wet, damaged or warped insulation boards.
     4. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.
     5. Wood nailers must be at least 3 1/2 inches (89 mm) wide or 1 inch (25 mm) wider than adjacent metal flange. Thickness must equal that of insulation but not less than 1 inch (25 mm) thickness.
     6. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
     7. Do not install any more insulation than will be completely waterproofed each day.
  3. INSULATION ATTACHMENT

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if a Hot Mopped system is specified.

* + 1. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if Mechanically Attached system is specified. FM Loss Prevention Data Sheet 1-29 no longer uses 50 and 75 percent increased fastener density in perimeter and corner areas for Adhered assemblies above FM 1-75.

* + 1. Enhance the perimeter and corner areas in accordance with the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if asphalt applied insulation is not specified

* + 1. Install insulation layers, maximum 4 feet by 4 feet (1220 mm by 1220 mm) board size, in a full and uniform mopping of hot asphalt applied at the rate of 25 lb/square (1.2 kg/sm). Stagger the joints of additional layers in relation to the insulation joints in the layer(s) below by a minimum of 6 inches (152 mm).

\*\* NOTE TO SPECIFIER \*\* Delete the next paragraph if adhesive applied insulation is not specified

* + 1. Install insulation layers, maximum 4 feet by 4 feet (1220 mm by 1220 mm), applied with FAST adhesive, or a maximum 4 feet by 8 feet (1220 mm by 2438 mm), applied with Flexible FAST Adhesive, coverage rate as necessary to achieve the specified attachment and uplift rating. Press each board firmly into place after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied, and roll with a weighted roller. Add temporary weight and use relief cuts to ensure boards are well adhered. Stagger the joints of additional layers by a minimum of 6 inches (152 mm).

\*\* NOTE TO SPECIFIER \*\* Retain the next article if ONLY if membrane is Sure-Weld FULLY ADHERED

* 1. MEMBRANE PLACEMENT AND ATTACHMENT (Sure-Weld Fully Adhered)
     1. Position Sure-Weld membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.
     2. Apply approved Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
        1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
        2. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.
     3. Position adjoining sheets to allow a minimum overlap of 2 inches.
     4. APEEL Protective Film should be removed from within areas that are to be heat-welded together. In areas that do not require heat welding, the APEEL Protective Film can be left in place for up to 90 days.
     5. Hot-air weld the Sure-Weld membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures. Carlisle recommends a test weld sample be made from a piece of scrap TPO to eliminate the need to remove a section from a completed seam. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
     6. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

\*\* NOTE TO SPECIFIER \*\* Retain the next article if ONLY if membrane is Sure-Weld SAT TPO FULLY ADHERED

* 1. MEMBRANE PLACEMENT AND ATTACHMENT (Sure-Weld SAT TPO Fully Adhered)
     1. Position Sure-Weld membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.
     2. Remove the release liner on one half of the sheet starting from the split in the liner at the middle of the sheet. The liner should be removed at an angle to reduce risk of splitting or tearing.
     3. Roll the membrane onto the substrate while avoiding wrinkles. To achieve the best adhesion, the membrane should be rolled onto the substrate at an angle with 150 lb weighted roller. When applying the Carlisle Sure-Weld SAT TPO membrane it is recommended to maintain a large curve on the leading edge of the membrane. This will help eliminate creases and bubbles that cannot be removed after the sheet is in place.
     4. Fold back the remaining half of the sheet and repeat the above process.
     5. Position adjoining sheets to allow a minimum overlap of 2 inches.
     6. Hot-air weld the Sure-Weld membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures. Carlisle recommends a test weld sample be made from a piece of scrap TPO to eliminate the need to remove a section from a completed seam. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
     7. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

\*\* NOTE TO SPECIFIER \*\* Retain the next article if ONLY if membrane is FleeceBACK FULLY ADHERED

* 1. MEMBRANE PLACEMENT AND ATTACHMENT (FleeceBACK Fully Adhered)
     1. Position and unroll successive sheets and align to provide for a minimum 3 inch (76 mm) wide splice.
     2. Fold adjacent sheets in half lengthwise to expose an approximate 12 foot (3657 mm) wide substrate area.
     3. Membrane which will have the adjacent sheet spliced over it should be adhered to the substrate first. In this fashion, selvage edge splice area will not be contaminated by setting splice edge into the FAST Adhesive.
     4. Spray or extrude FAST Adhesive onto the substrate and allow to foam up approximately 1/8 inch (3 mm). Wait for the adhesive to achieve "string" when a small object is lifted out of the adhesive.
     5. Place the membrane into adhesive after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied and roll with a weighted roller. Add temporary weight and use relief cuts to ensure boards are well adhered.
     6. Apply FAST Adhesive to the substrate and continue process described above until all sheets are fully bonded, allowing for necessary splice overlaps at selvage edges. At end laps (along the width of the sheet) membrane shall be butted together which will be overlaid with 6 inch wide Sure-Weld Reinforced Membrane hot air welded along all edges. Pressure-Sensitive Cover strip is not permitted in this situation.

\*\* NOTE TO SPECIFIER \*\* Retain the next article if ONLY if membrane is MECHANICALLY ATTACHED.

* 1. MEMBRANE PLACEMENT AND ATTACHMENT (Mechanically Attached)
     1. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour prior to attachment. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
     2. Secure the membrane with the required Carlisle Fasteners and Plates centered over the pre-printed marks approximately 1-1/2 inches from the edge of the membrane sheet.
     3. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's current application requirements.

\*\* NOTE TO SPECIFIER \*\* Retain the next article if ONLY if membrane is Sure-Weld AFX FleeceBACK Hot Mopped.

* 1. MEMBRANE PLACEMENT AND ATTACHMENT (Asphalt Adhered)
     1. General
        1. Store membrane in a dry area to prevent absorption of moisture in the fleece backing. If moisture is present, it must be removed with a wet-vac system and the membrane must be allowed to fully dry prior to membrane adhesion.
        2. The temperature of the asphalt during application must be within 25 F (4 C) of the EVT (Equiviscous Temperature). The manufacturer's heating instructions (i.e., maximum heating temperature, prolonged storage temperature guidelines) must be strictly followed.
        3. Apply asphalt at 18-22 pounds per square (100 square feet). It is important that "heavy spots" of asphalt, typically occurring at mopping overlaps or where the mop is first positioned, be avoided. At these areas, the asphalt must be spread evenly to avoid a heavy coverage rate that can cause asphalt saturation of the fleece backing. Asphalt saturation of the fleece must be avoided.
        4. If spreaders are used to apply asphalt, care must be taken to ensure the proper coverage rate is maintained. Do not overlap asphalt layers at multiple pass lines since the heavy coverage rate occurring at these overlapping areas must be avoided.
        5. Mopping the membrane directly to Polyisocyanurate insulation is not permitted. Carlisle HP Recovery Board must be used as an overlayment when insulation is specified. Carlisle Modified Base Sheet may be used in place of the Carlisle HP Recovery Board when fastened to a steel or wood deck following manufacturer's requirements for maximum 15-year warranty.
     2. When positioning membrane along the length for splices, allow the fleece backing to extend approximately 1/2 inch (13 mm) above adjoining membrane to avoid direct contact between TPO membrane and hot asphalt.
     3. When using a mop to apply asphalt, position the membrane over the substrate overlapping adjacent sheets to accommodate membrane splicing and fold in half lengthwise to expose the substrate and the back side of the membrane (full width of the membrane by approximately half the length).
     4. Beginning at the membrane fold, apply asphalt to the full width of the membrane extending a maximum of 4 to 5 feet while rolling the membrane into the asphalt immediately. The asphalt temperature at the time of membrane adhesion must be above 350 F (176 C). Continue to apply asphalt for the full width of the membrane extending 4 to 5 feet at a time while embedding the membrane into the asphalt until the entire half of the sheet is adhered. Fold back the unbonded half of the membrane and repeat the bonding procedures identified above.
     5. When using spreaders to apply asphalt, the membrane is folded widthwise dependent on the size of the spreader (36" - 57" wide); i.e., if a 36" wide spreader is used, the membrane will be folded to expose approximately a 36" wide by 50' long area. After the asphalt is applied in a single pass, the membrane is rolled into the asphalt. After mopping the membrane, apply asphalt to the remaining substrate area in single passes and continue to bond membrane as identified above.
        1. Membrane must be embedded into asphalt immediately after each spreader pass to ensure asphalt temperature is at least 350 F (176.7 C) at the time of membrane embedment.
        2. Take care that the asphalt is not dropped directly on the back of the membrane. Use a mop to spread asphalt at pass lines and under sheet folds to prevent a heavy coverage rate.
     6. After membrane mopping, immediately after adhesion, brush down the sheet with a soft bristled broom using light to medium pressure. Do not use weighted rollers or heavy pressure when brooming the membrane to avoid asphalt saturation of the fleece.
  2. SEAM WELDING

\*\* NOTE TO SPECIFIER \*\* Retain the following Paragraph only if Sure-Weld APEEL TPO is specified. Delete if not required.

* + 1. APEEL Protective Film should be removed from within areas that are to be heat-welded together. In areas that do not require heat welding, the APEEL Protective Film can be left in place for up to 90 days.
    2. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph if 60-mil thick or greater membrane is specified

* + 1. When utilizing membrane greater than 45-mil thickness, overlay all splice intersections with Sure-Weld T-Joint Cover.
    2. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
    3. Repair all seam deficiencies the same day they are discovered.
    4. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.
  1. FLASHING
     1. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane or prefabricated accessories. Sure-Weld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.
     2. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

\*\* NOTE TO SPECIFIER \*\* Retain the following Paragraph only if Sure-Weld APEEL TPO is specified. Delete if not required.

* + 1. APEEL Protective Film should be removed and discarded after the completion of the roof system installation.

\*\* NOTE TO SPECIFIER \*\* Retain the following Paragraph only if Sure-Weld Contour Rib Profile is specified. Delete if not required.

* + 1. Sure-Weld Contour Rib Profiles:
       1. The Contour Rib Profile is recommended for use with FleeceBACK TPO adhered roofing systems.
       2. The Sure-Weld Contour Rib Profiles should be positioned parallel to the laps of the installed TPO roofing system and parallel with the roof slope where possible.
       3. Ensure that all welding surfaces are clean and dry. Inspect all seam areas for proper weld prior to installing Sure-Weld Contour Rib Profile.
       4. Contour Rib Profile spacing can be individually determined to achieve the desired appearance.
       5. Connecting multiple ribs is achieved by using fiberglass pins. Insert a pin half-way into the end of one profile. Connect the adjoining rib by inserting the exposed end of the pin into the alignment hole. Repeat previous steps for additional TPO Contour Rib profiles.
  1. WALKWAYS
     1. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings.

\*\* NOTE TO SPECIFIER \*\* Select Walkway requirement. Delete one of the next two paragraphs.

* + 1. Hot-air weld walkway pads to the membrane in accordance with the manufacturer's current application guidelines.
    2. Loose lay concrete pavers over an approved protection sheet in accordance with the manufacturer's current application guidelines.

\*\* NOTE TO SPECIFIER \*\* Delete the entire next article if Roof Gardens are not specified. Retain only the products required for the roof project specified in this section.

* 1. ROOF GARDEN COMPONENT APPLICATION
     1. General:
        1. Inspection:
           1. Membranes shall be adhered to minimum 1/2 inch Carlisle DensDeck Prime, 1/2 inch (12 mm) Carlisle SecurRock, or to structurally sloped concrete deck.
           2. A water test is required to ensure the waterproof integrity of the membrane system. Inspect for leaks and repair membrane if defects are found. Retest after repairs have been made.
           3. Sweep the surface of the membrane to remove all debris and loose or foreign material.
     2. Installation:
        1. Shallow Assembly - up to 4 inches in depth.
           1. Carlisle Roofing Membrane.
           2. CCW MiraDRAIN G4 Composite.
           3. Carlisle Engineered Growth Media.
           4. Vegetated Sedum Tiles, Sedum Plugs, or Sedum Cuttings with Carlisle Moisture Retention Gel.
        2. Medium Assembly - 4 to 8 inches in depth.
           1. Carlisle Roofing Membrane.
           2. CCW 300HV.
           3. 40 mil non-reinforced Geomembrane or Biobarrier.
           4. CCW MiraDRAIN G4 Drainage Composite.
           5. Carlisle Engineered Growth Media.
           6. Vegetated Sedum Tiles, Sedum Plugs, or Sedum Cuttings with Carlisle Moisture Retention Gel.
        3. Deep Assembly - greater than 8 inches in depth.
           1. Carlisle Roofing Membrane.
           2. Insulfoam Foamular or DOW Polystyrene Insulation (25 to 60 psi).
           3. CCW 300HV.
           4. 40 mil non-reinforced Geomembrane or Biobarrier.
           5. CCW MiraDrain G4 Drainage Composite.
           6. Carlisle Engineered Growth Media.
           7. Vegetated Sedum Tiles, Sedum Plugs, or Sedum Cuttings with Carlisle Moisture Retention Gel.
     3. G4 Application: Unroll and install to provide a minimum 2 inch (51 mm) side overlap. Butt the end laps next to each other.
     4. Protection Fabric: Unroll directly over the membrane and provide a minimum 2 inch (51 mm) side and end overlap.
     5. Insulation: Loose apply insulation directly over the membrane with all joints tightly butted. Extend insulation up walls and curbs to the height of the growth media layer.
     6. Root Barrier:
        1. On Extensive garden systems, position root barrier loose-laid over the protection fabric. Overlap adjacent sheets a minimum of 2 inches (51 mm) and seam in accordance with manufacturer's current recommendations for the field conditions and membrane specified.
        2. On Intensive roof garden assemblies loose-laid root barrier over the extruded polystyrene insulation layer and seam in accordance with manufacturer's current recommendations for the field conditions and membrane specified.
        3. Extend root barrier up walls, curbs, etc. to the height of the top of the growth media layer.
     7. Growth Media/Planting
        1. Spread engineered soil mixes to the specified depth, plus 15 percent. Dispense to locations in a manner that will not overload the structure.
        2. Thoroughly soak soil with water using a sprinkler or hand sprayer.
        3. Plant vegetation in accordance with the landscape architect/designer plans and instructions for the intended soil and climate.
  2. DAILY SEALS
     1. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
     2. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.
  3. CLEAN UP
     1. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
     2. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.
  4. PROTECTION
     1. Protect installed products until completion of project.
     2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION