SECTION 07 54 23

TPO THERMOPLASTIC SINGLE-PLY ROOFING

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\*\* NOTE TO SPECIFIER \*\* GAF, Commercial Roofing Products; Thermoplastic Polyolefin (TPO) Roofing.  
 This section is based on the products of GAF, Commercial Roofing Products, which is located at:

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Parsippany, NJ 07054  
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 [ [Click Here](http://www.arcat.com/arcatcos/cos32/arc32667.cfm) ] for additional information.

Founded in 1886, GAF is one of the oldest manufacturers of commercial and residential roofing materials in the United States, and its proud tradition of innovation and excellence has made it one of the most respected.  
   
 GAF offers the most comprehensive line of quality roofing systems in the industry. Whether your design calls for an asphalt fiberglass shingle, a conventional built-up roof, modified bitumen, single-ply or composite system, GAF's superior products and roofing specifications will meet your needs for a complete single source installation. Today, GAF employs over 3,300 people in 26 plants throughout the United States, and GAF products are available across the country and through select distribution centers worldwide.  
   
 GAF manufactures and supplies a complete line of products for single-ply roofing systems most commonly used in commercial applications: Thermoplastic Polyolefin (TPO) and Poly Vinyl Chloride (PVC),. Each system offers specific advantages in terms of economy, strength, construction, fire resistance and overall durability.  
  
See our SpecWizard: [Click Here](http://www.arcat.com/specwizard/07545gaf/index.htm)

1. GENERAL
   1. SECTION INCLUDES

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

* + 1. Thermoplastic Single-Ply Roofing.
    2. Roof Insulation.
  1. RELATED SECTIONS

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

* + 1. Section 06 10 00: Rough Carpentry: Roof blocking installation and requirements.
    2. Section 07 62 00: Sheet Metal Flashing and Trim: Metal flashing and counter flashing installation and requirements.
    3. Section 22 30 00: Plumbing Specialties: roof drains, scuppers, gutters and downspout installation and requirements.
  1. REFERENCES

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

* + 1. Factory Mutual (FM Global) - Approval Guide.
       1. Factory Mutual Standard 4470 - Approval Standard for Class 1 Roof Covers.
    2. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TGFU R1306).
    3. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards.
       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 728 - Standard Specification for Perlite Thermal Insulation Board.
       4. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
       5. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
       6. ASTM D 312 - Standard Specification for Asphalt Used in Roofing.
       7. ASTM D 1079 - Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials.
       8. ASTM D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
       9. ASTM D 4434 - Standard Specification for Poly (Vinyl Chloride) Sheet Roofing.
       10. ASTM D-751 - Standard Test Methods for Coated Fabrics.
       11. ASTM D-2137 - Standard Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics.
       12. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials.
       13. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
       14. ASTM D-471 - Standard Test Method for Rubber Property-Effect of Liquids.
       15. ASTM D-1149 - Standard Test Methods for Rubber Deterioration-Cracking in an Ozone Controlled Environment.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if CRRC Roofs are Specified.

* + - 1. ASTM C-1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if CRRC Roofs are Specified.

* + - 1. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if ENERGYSTAR Roofs are Specified.

* + - 1. ASTM E 903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres.
    1. U.S. Green Building Council (USGBC).
    2. Leadership in Energy and Environmental Design (LEED).
    3. Factory Mutual (FM Global) - Approval Guide.
    4. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TGFU R1306).
    5. California Title 24 Energy Efficient Standards.
    6. ENERGYSTAR.
    7. Cool Roof Rating Council (CRRC).
    8. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet.
    9. National Roofing Contractors Association (NRCA).
    10. American Society of Civil Engineers (ASCE).
        1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
  1. DEFINITIONS
     1. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.
  2. LEED CERTIFICATION
     1. Provide a roofing system that will achieve or aid in the qualification of points satisfying:
        1. Sustainable Site credit 7.2 - Heat Island Effect - Roof.
        2. Materials & Resource credit 4 - Recycled Content.
        3. Materials & Resource credit 5 - Local and Regional Materials.
        4. Indoor Air Quality credit 4.1 - Low-Emitting Materials - Adhesives and Sealants.
  3. PERFORMANCE REQUIREMENTS
     1. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.
     2. GAF shall provide all primary roofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.
  4. SUBMITTALS
     1. Submit under provisions of Section 01 30 00.
     2. [ [Product Data](http://www.arcat.com/arcatcos/cos32/arc32667.cfm) ]: Provide [ [Product Data](http://www.arcat.com/arcatcos/cos32/arc32667.cfm) ] sheets for each type of product indicated in this section.
     3. Shop Drawings: Provide manufacturers standard details and approved shop drawings for the roof system specified.
     4. Samples: Provide samples of insulations, fasteners, membrane materials and accessories for verification of quality.
     5. LEED submittal: Coordinate with Section 01115 - Green Building Requirements, for LEED certification submittal forms and certification templates.
  5. QUALITY ASSURANCE
     1. Manufacturer Qualifications: GAF shall provide a roofing system that meets or exceeds all criteria listed in this section.
     2. Installer Minimum Qualifications:

\*\* NOTE TO SPECIFIER \*\* Delete installer classification not required.

* + - 1. Installer shall be classified as a Master Select Contractor as defined and certified by GAF.
      2. Installer shall be classified as a Master Contractor as defined and certified by GAF.
      3. Installer shall be classified as an Approved Contractor as defined and certified by GAF.
    1. Source Limitations: Components listed shall be provided by a single manufacturer or approved by the primary roofing manufacturer.

\*\* NOTE TO SPECIFIER \*\* Only Diamond Pledge system. Delete if not required.

* + 1. Final Inspection: Manufacturer's representative shall provide a comprehensive final inspection after completion of the roof system. All application errors shall be addressed and final punch list completed.
  1. PRE-INSTALLATION CONFERENCE
     1. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, architect, owner, GAF representative and any other persons directly involved with the performance of the work. The installer shall record conference discussions to include decisions, agreements, and open issues and furnish copies of recorded discussions to each attending party. The primary purpose of the meeting is to review foreseeable methods and procedures related to roofing work.
  2. REGULATORY REQUIREMENTS
     1. Work shall be performed in a safe, professional manner, conforming to federal, state and local codes.
     2. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class rating for roof slopes indicated.

\*\* NOTE TO SPECIFIER \*\* Delete roof class rating not required.

* + - 1. UL Class A rating.
      2. UL Class B rating.
      3. UL Class C rating.
    1. Windstorm Classification: Provide a roofing system which will achieve the following Factory Mutual wind uplift rating, as listed in the current FM Approval Guide.

\*\* NOTE TO SPECIFIER \*\* Delete roof wind uplift rating not required.

* + - 1. Factory Mutual 1-60.
      2. Factory Mutual 1-75.
      3. Factory Mutual 1-90.
      4. Factory Mutual 1-120.
      5. Factory Mutual 1-135.
      6. Factory Mutual 1-150.
      7. Factory Mutual 1-180.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Deliver roofing materials to the site in original containers, with factory seals intact. Products shall carry either a GAF or BMCA label.
     2. Store pail goods in their original undamaged containers in a clean, dry location within their specified temperature range.
     3. Do not expose materials to moisture in any form before, during, or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
     4. Remove manufacturer supplied plastic covers from materials provided with such. Use "breathable" type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.
     5. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
  2. PROJECT CONDITIONS
     1. Weather:
        1. Proceed with roofing only when existing and forecasted weather conditions permit.
        2. Ambient temperatures shall be above 45 degrees F (7.2 degrees C) when applying hot asphalt or water based adhesives.
  3. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Delete warranty not required.

* + 1. Provide manufacturer's standard WeatherStopper Diamond Pledge Guarantee with single source coverage and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.

\*\* NOTE TO SPECIFIER \*\* Delete warranty years not required.

* + - 1. Duration: Five (5) years from the date of completion.
      2. Duration: Ten (10) years from the date of completion.
      3. Duration: Fifteen (15) years from the date of completion.
      4. Duration: Twenty (20) years from the date of completion.
    1. Provide manufacturer's standard WeatherStopper Diamond Pledge Guarantee with single source Edge to Edge coverage and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.

\*\* NOTE TO SPECIFIER \*\* Delete warranty years not required.

* + - 1. Duration: Five (5) years from the date of completion.
      2. Duration: Ten (10) years from the date of completion.
      3. Duration: Fifteen (15) years from the date of completion.
      4. Duration: Twenty (20) years from the date of completion.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if a Diamond Pledge Warranty is specified.

* + 1. WELL ROOF Advantage. Provides single source coverage\* and no monetary limitation, where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.

\*\* NOTE TO SPECIFIER \*\* Delete warranty years not required.

* + - 1. Duration: Five (5) years from the date of completion.
      2. Duration: Ten (10) years from the date of completion.
      3. Duration: Fifteen (15) years from the date of completion.
      4. Duration: Twenty (20) years from the date of completion.
    1. Extension: GAF also guarantees to the original or first subsequent owner that coverage shall be extended by 25% of the original guarantee length, provided that the roof in inspected and maintained in accordance with the MAINTAINENCE section of this specification.
    2. Provide manufacturer's standard WeatherStopper System Pledge Guarantee with single source coverage and a monetary limitation of one (1) dollar per square foot where the manufacturer agrees to repair or replace components in the roof system, which cause a leak due to failure in materials or workmanship.

\*\* NOTE TO SPECIFIER \*\* Delete warranty years not required.

* + - 1. Duration: Five (5) years from the date of completion.
      2. Duration: Ten (10) years from the date of completion.
      3. Duration: Fifteen (15) years from the date of completion.
      4. Duration: Twenty (20) years from the date of completion.
    1. Provide manufacturer's standard WeatherStopper Integrated Roofing System Guarantee where the manufacturer agrees to repair or replace the portion of the roofing materials, which have resulted in a leak due to a manufacturing defect or defects caused by ordinary wear and tear.

\*\* NOTE TO SPECIFIER \*\* Delete warranty years not required.

* + - 1. Duration: Five (5) years from the date of completion.
      2. Duration: Ten (10) years from the date of completion.
      3. Duration: Fifteen (15) years from the date of completion.
      4. Duration: Twenty (20) years from the date of completion.
    1. Provide EverGuard TPO Reflectivity Limited Warranty to the original building owner, that the EverGuard TPO white roof membrane will meet or exceed the initial and "aged" ENERGY STAR reflectivity requirements for low slope roofing membranes (65% initial, 50% aged) when installed and maintained in accordance with GAF's requirements. The aged reflectivity shall meet or exceed these requirements when measured after cleaning the membrane in accordance with GAF recommendations.

\*\* NOTE TO SPECIFIER \*\* Puncture Warranty for 60 or 80 Mil only. Delete if not required.

* + 1. Provide EverGuard TPO Puncture Resistance Limited Warranty for the original building owner, that the EverGuard TPO roof membrane will provide puncture and tear resistance when installed and maintained in accordance with GAF's requirements.
    2. Provide manufacturer's standard prorated material warranty where the manufacturer agrees to repair or replace to portion of the roofing materials that have resulted in a leak due to a manufacturing defect or defects caused by ordinary wear and tear.

\*\* NOTE TO SPECIFIER \*\* Verify available warranty term with manufacturer and insert. Delete if not required.

* + - 1. Duration:

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: GAF, which is located at: 1 Campus Drive; Parsippany, NJ 07054; Toll Free Tel: 800-ROOF-411; Tel: 973-628-3000; Fax: 973-628-3451; Email: [TechnicalQuestionsGAF@gaf.com](mailto:TechnicalQuestionsGAF@gaf.com;); Web: [www.gaf.com](http://www.gaf.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.

\*\* NOTE TO SPECIFIER \*\* Delete insulation if not required.

* 1. INSULATION

\*\* NOTE TO SPECIFIER \*\* Delete insulation types not required.

* + 1. Rigid polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972, EnergyGuard Polyiso, with the following characteristics:

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness:
      2. Thermal Resistance (LTTR value): \_\_\_\_\_\_
    1. Rigid tapered polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972, EnergyGuard Tapered Polyiso, with the following characteristics:

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_.
      2. Thermal Resistance (LTTR value): \_\_\_\_\_\_.
    1. Rigid polyisocyanurate cover board, with a coated polymer-bonded glass fiber mat facers on both major surfaces of the core foam conforming to or exceeding the requirements of ASTM C 1289 / Class 4, Grade 1 . EnergyGuard HD Polyiso, with the following characteristics:
       1. Board Thickness: 1/2 inch (12.7mm)
       2. Minimum Compressive Strength: 80psi (551kPa)
       3. Thermal Resistance (LTTR value) of: > 2.5
    2. Rigid polyisocyanurate cover board, with a coated polymer-bonded glass fiber mat facers on both major surfaces of the core foam conforming to or exceeding the requirements of ASTM C 1289 / Class 4, Grade 1 . EnergyGuard HD PLUS Polyiso, with the following characteristics:
       1. Board Thickness: 1/2 inch (12.7mm).
       2. Minimum Compressive Strength: 110psi (758 kPa).
       3. Thermal Resistance (LTTR value) of: > 2.5.
    3. Rigid polyisocyanurate board, with an coated glass-fiber facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972. EnergyGuard Ultra Polyiso Insulation, with the following characteristics:
       1. Board Thickness:
       2. Thermal Resistance (LTTR value) of:
    4. Rigid polyisocyanurate board, with an coated glass-fiber facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972. EnergyGuard Ultra Tapered Polyiso Insulation, with the following characteristics:
       1. Board Thickness:
       2. Thermal Resistance (LTTR value) of:
    5. Rigid polyisocyanurate foam insulation with 1/2 inch (13 mm) perlite roof insulation laminated to one side and a strong fibrous glass facer on the other; conforms to or exceeds the requirements of ASTM C 1289 / FS HH-I, EnergyGuard Composite, with the following characteristics:

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness:
      2. Thermal Resistance (LTTR value):
    1. Rigid polyisocyanurate foam insulation with 1/2 inch (13 mm) gypsum board laminated to one side and a strong fibrous glass facer on the other; conforms to or exceeds the requirements of ASTM C 1289 / FS HH-I, EnergyGuard Composite, with the following characteristics:

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_.
      2. Thermal Resistance (LTTR value): \_\_\_\_\_\_.
    1. Rigid polyisocyanurate foam insulation with 1/2 inch (13 mm) cellulose fiber board laminated to one side and a strong fibrous glass facer on the other; conforms to or exceeds the requirements of ASTM C 1289 / FS HH-I, EnergyGuard Composite, with the following characteristics:

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_.
      2. Thermal Resistance (LTTR value): \_\_\_\_\_\_.
    1. Expanded perlite mineral aggregate board conforming to or exceeding the requirements of FS HH-I-529b, ANSI/ASTM C 728, EnergyGuard Perlite, with the following characteristics:
       1. Board Density: 9 lb/cf (144 kg/cm) minimum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. Expanded perlite mineral aggregate board conforming to or exceeding the requirements of FS HH-I-529b, ANSI/ASTM C 728. EnergyGuard Tapered Perlite, with the following characteristics:
       1. Board Density: 9 lb/cf (144 kg/cm) minimum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_.
      2. Thermal Resistance (R value): \_\_\_\_\_\_.
    1. ASTM C-578 Type II, expanded polystyrene recover board (EPS), with the following characteristics:
       1. Compressive Strength: 15 psi (0.1 MPa) minimum.
       2. Board Density: 1.35 lb per cubic foot (21.6 kg/cm) minimum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance: \_\_\_\_\_\_

\*\* NOTE TO SPECIFIER \*\* A separation mat or cover board must be installed over this insulation prior to installing the EverGuard TPO roof membrane.

* + 1. ASTM C-578 Type IX, High density expanded polystyrene board (EPS), with the following characteristics:
       1. Compressive Strength: 25 psi (0.17 MPa) nominal.
       2. Board Density: 1.8 lb per cubic foot (28.8 kg/cm) minimum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. ASTM C-578 Type X, extruded polystyrene board (XPS), with the following characteristics:
       1. Compressive Strength: 15 psi (0.1 MPa) minimum.
       2. Board Density: 1.3 lb per cubic foot (20.8 kg/cm) minimum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. ASTM C-578 Type X, 3/8 inch (9.5 mm) extruded polystyrene fan-fold board (XPS), with the following characteristics:
       1. Compressive Strength: 15 psi (0.1 MPa) minimum.
       2. Board Density: 1.3 lb per cubic foot (20.8 kg/cm) minimum.
       3. Board Thickness: 3/8 inch (5mm).
       4. Thermal Resistance (R value): 1.5 (2.8 C/W).

\*\* NOTE TO SPECIFIER \*\* Delete roof board if not required.

* 1. ROOF BOARD

\*\* NOTE TO SPECIFIER \*\* Delete roof board types not required.

* + 1. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides, and pre-primed on one side. GP Dens-Deck Prime Roof Board, distributed by GAF.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides and a factory-applied low perm, integrated, durable coating that enhances bond strength of the membrane system. GP Dens-Deck DuraGuard Roof Board, distributed by GAF.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides. GP Dens-Deck Roof Board, distributed by GAF.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: \_\_\_\_\_\_
      2. Thermal Resistance (R value): \_\_\_\_\_\_
    1. Fiber-reinforced gypsum panel with an integral water-resistant core. Securock Roof Board by US Gypsum.

\*\* NOTE TO SPECIFIER \*\* Provide project specific information.

* + - 1. Board Thickness: 1/4 inch (6mm).
      2. Thermal Resistance (R value) of: .20.
  1. INSULATION ACCESSORlES
     1. Tapered Edge Strip: Factory fabricated rigid perlite strip cut at angles to provide a smooth transition between differences in elevation. EnergyGuard Tapered Edge Strip, by GAF.

\*\* NOTE TO SPECIFIER \*\* Delete separation sheets if not required.

* 1. SEPARATION SHEETS

\*\* NOTE TO SPECIFIER \*\* Delete sheet types not required.

* + 1. Fire-resistant glass fiber mat used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates. Each roll contains ten (10) squares (90 sqm) of material, 4 feet by 250 feet (1.2 m by 7.69 m), 80 lb (36.4 kg), Fiberglass Fire Sheet 10 by GAF.
    2. Fire-resistant glass fiber mat used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates. Each roll contains four (4) squares (38 sqm) of material, 4 feet by 105 feet (1.2 m by 32.3 m), 79 lbs. (35900 g), Fiberglass Fire Sheet 50 by GAF.
    3. Non-woven polyester UV-stabilized mat, 3 oz./yd2 (112.5 g/sqm) used as a separation sheet beneath membranes as a protection layer and used over membranes in ballast applied assemblies. Each roll contains thirty (30) squares (279 sqm) of material, 10 feet by 300 feet (3.1 m by 92.3 m), 75 lb (34.100 kg), EverGuard Poly Separation Layer 3 oz.by GAF.
    4. Non-woven polyester UV-stabilized mat, 6 oz./sft (225 g/sqm) used as a separation sheet beneath membranes as a protection layer and used over membranes in ballast or paver applied assemblies. Each roll contains thirty (30) squares (279 sqm) of material, 10 feet by 300 feet (3.1 m by 92.3 m), 125 lbs. (56.8 kg), EverGuard Poly Cushioning Layer 6 oz. by GAF.

\*\* NOTE TO SPECIFIER \*\* Below for use in mechanically attached systems only.

* + 1. Fire-resistant non-woven fiberglass slip sheet used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates providing a UL class A fire rating. Each roll contains ten (10) squares (1,000 sq. ft.) of material, 6' x 166.7' (1.83m x 50.8m), 110 lbs. nominal weight, VersaShield Solo Fire Resistant Slip Sheet by GAF.
  1. MEMBRANE MATERlALS

\*\* NOTE TO SPECIFIER \*\* Delete membrane materials not required.

* + 1. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (1.14 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.05 m by 30.48 m) weighing 256 lb (116 kg) each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 142 lbs. Half sheet roll required for roof perimeter use in mechanically attached systems. EverGuard TPO 45 mil single-ply roofing membrane by GAF.
    2. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (1.5 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 322 lb (146 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 162 lbs. EverGuard TPO 60 mil single-ply roofing membrane by GAF.
    3. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (2.0 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 420 lb (191 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 210 lbs. EverGuard TPO 80 mil single-ply roofing membrane by GAF.
    4. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (1.14 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 284 lb (129 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 142 lbs. EverGuard FB 450 Ultra single-ply roofing membrane by GAF.
    5. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (1.5 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 350 lb (159 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 175 lbs. EverGuard FB 600 Ultra single-ply roofing membrane by GAF.
    6. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (2.0 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 500 sf (46 sqm) of roofing material, 10 feet by 50 feet (3.1 m by 15.2 m), weighing 232 lb (105 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 50', weighing 116 lbs. EverGuard FB 800 Ultra single-ply roofing membrane by GAF.
    7. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (45 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 301 lbs. (137 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    8. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 365 lbs. (166 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    9. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (80 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 450 lbs. (204 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    10. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (45 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m),, weighing approx. 303 lbs (137 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.
    11. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m),, weighing approx. 333 lbs (151 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.
    12. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (80 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m),, weighing approx. 440 lbs (200 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.

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

* + - 1. Color: White.
      2. Color: Gray.
      3. Color: Tan.
      4. Color: Regal Red.
      5. Color: Regal Blue.
      6. Color: Hartford Green.
      7. Pre-Formulated Color: Colonial Red.
      8. Pre-Formulated Color: Dark Brown.
      9. Pre-Formulated Color: Dark Bronze.
      10. Pre-Formulated Color: Desert Tan.
      11. Pre-Formulated Color: Electric Blue.
      12. Pre-Formulated Color: Goldenrod.
      13. Pre-Formulated Color: Ivy Green.
      14. Pre-Formulated Color: Moss Green.
      15. Pre-Formulated Color: Patina Green.
      16. Pre-Formulated Color: Slate Gray.
      17. Pre-Formulated Color: Teal.
      18. Pre-Formulated Color: Terra Cotta.
      19. Pre-Formulated Color: Tropical Green.
      20. Pre-Formulated Color: Smoke Gray.
      21. Pre-Formulated Color: Energy Gray.
      22. Pre-Formulated Color: Energy Tan.
      23. Color as Specified by the Architect.
  1. FLASHING MATERlALS

\*\* NOTE TO SPECIFIER \*\* Delete flashing materials not required.

* + 1. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (1.14 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.05 m by 30.48 m) weighing 256 lb (116 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 142 lbs. EverGuard TPO 45 mil thermoplastic single-ply roofing membrane by GAF.
    2. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (1.5 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 322 lb (146 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 162 lbs. EverGuard TPO 60 mil thermoplastic single-ply roofing membrane by GAF.
    3. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (2.0 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 420 lb (191 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 210 lbs. EverGuard TPO 80 mil thermoplastic single-ply roofing membrane by GAF.
    4. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (1.14 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 284 lb (129 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 142 lbs. EverGuard FB 450 Ultra thermoplastic single-ply roofing membrane by GAF.
    5. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (1.5 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sf (93 sqm) of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m) weighing 350 lb (159 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 175 lbs. EverGuard FB 600 Ultra thermoplastic single-ply roofing membrane by GAF.
    6. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (2.0 mm) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 500 sf (46 sqm) of roofing material, 10 feet by 50 feet (3.1 m by 15.2 m), weighing 232 lb (105 kg) Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 50', weighing 116 lbs. EverGuard FB 800 Ultra thermoplastic single-ply roofing membrane by GAF.
    7. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.050 inch (50 mil) thickness, for use as a single ply roofing membrane. Engineered to provide high solar reflectivity and extremely high UV and thermal resistance. These combined characteristics produce a single-ply membrane suitable for the most demanding solar installations as well as any other high heat or solar loading applications. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10' X 100',. Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100',. EverGuard Extreme TPO 50 mil Fleece-Back Membrane thermoplastic single-ply roofing membrane by GAF.
    8. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, for use as a single ply roofing membrane. Engineered to provide high solar reflectivity and extremely high UV and thermal resistance. These combined characteristics produce a single-ply membrane suitable for the most demanding solar installations as well as any other high heat or solar loading applications. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10' X 100',. Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 175 lbs. EverGuard Extreme TPO 60 mil Fleece-Back Membrane thermoplastic single-ply roofing membrane by GAF.
    9. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.070 inch (70 mil) thickness, for use as a single ply roofing membrane. Engineered to provide high solar reflectivity and extremely high UV and thermal resistance. These combined characteristics produce a single-ply membrane suitable for the most demanding solar installations as well as any other high heat or solar loading applications. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 500 sq.ft. of roofing material, 10' X 50',. Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 50'. EverGuard Extreme TPO 70 mil Fleece-Back Membrane thermoplastic single-ply roofing membrane by GAF.
    10. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (80 mil) thickness, for use as a single ply roofing membrane. Engineered to provide high solar reflectivity and extremely high UV and thermal resistance. These combined characteristics produce a single-ply membrane suitable for the most demanding solar installations as well as any other high heat or solar loading applications. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 500 sq.ft. of roofing material, 10' X 50', Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 50',. EverGuard Extreme TPO 80 mil Fleece-Back Membrane thermoplastic single-ply roofing membrane by GAF.
    11. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (45 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 301 lbs. (137 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    12. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 365 lbs. (166 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    13. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (80 mil) thickness, and a 3" lap designed to be hot air welded. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 450 lbs. (204 kg) EverGuard Freedom TPO HW single-ply roofing membrane by GAF.
    14. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.045 inch (45 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m),, weighing approx. 303 lbs (137 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.
    15. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 333 lbs (151 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.
    16. A self adhered, smooth surfaced, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.080 inch (80 mil) thickness, and a surface adhesive seaming technology. For use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM 6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10 feet by 100 feet (3.1 m by 30.5 m), weighing approx. 440 lbs (200 kg). EverGuard Freedom TPO Membrane with RapidSeam single-ply roofing membrane by GAF.

\*\* NOTE TO SPECIFIER \*\* Bitumen for insulation installation. Delete if not required.

* 1. BITUMEN
     1. Asphalt bitumen: ASTM D 312 Type III & IV.
  2. ADHESIVES, SEALANTS AND PRIMERS

\*\* NOTE TO SPECIFIER \*\* Delete materials not required.

* + 1. Solvent-based Bonding Adhesive: Solvent based adhesive for use with EverGuard TPO membranes, EverGuard 1121 Bonding Adhesive, by GAF.
    2. Low VOC solvent-based Bonding Adhesive: Solvent based rubberized adhesive for use with EverGuard TPO membranes, EverGuard Low VOC Bonding Adhesive, by GAF.
    3. Water-based Bonding Adhesive: Solvent based adhesive for use with EverGuard TPO membranes, EverGuard WB181 Bonding Adhesive, by GAF.
    4. Two-part VOC free low rise polyurethane foam adhesive for use with fleece-back membranes, LRF M Adhesive by GAF.
    5. Two-part VOC free low rise polyurethane foam adhesive for use with fleece-back membranes, LRF O Adhesive by GAF.
    6. Low VOC solvent based liquid, required to protect field cut edges of EverGuard TPO membranes. Applied directly from a squeeze bottle, EverGuard Low VOC Cut Edge Sealant, by GAF.
    7. Solvent based liquid, required to protect field cut edges of EverGuard TPO membranes. Applied directly from a squeeze bottle, EverGuard TPO Cut Edge Sealant, by GAF.
    8. Solvent based primer for preparing surfaces to receive butyl based adhesive tapes, EverGuard TPO Primer, by GAF.
    9. Low VOC solvent based cleaner used to clean exposed or contaminated seam prior to heat-welding or priming, EverGuard CleanWeldConditioner, by GAF.
    10. Low VOC solvent based primer for preparing surfaces to receive butyl based adhesive tapes, EverGuard TPO Low VOC Primer, by GAF.
    11. Solvent based seam cleaner used to clean exposed or contaminated seam prior to heat welding, EverGuard TPO Seam Cleaner, by GAF
    12. One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange. EverGuard Water-Block, by GAF.
    13. Solvent based, trowel grade synthetic elastomeric sealant. Durable and UV resistant suitable for use where caulk is typically used. Available in 10 oz. tubes, FlexSeal Caulk Grade Roof Sealant by GAF.
    14. Commercial grade roofing sealant suitable for sealing the upper lip of exposed termination bars and penetrations and around clamping rings and comes with a 20 year limited warranty against leaks caused by manufacturing defects, FlexSeal Roof Sealant, by GAF.
    15. One-part moisture cure, self-leveling sealant designed for use in pitch pans, EverGuard One-Part Pourable Sealer by GAF.
    16. 100 percent solids epoxy based two-part sealant suitable for filling sealant pans at irregularly-shaped penetrations. Epoxy is part A. Polyamide is part B. EverGuard Two-Part Pourable Sealant, by GAF.
    17. Asphalt primer: ASTM D 41 Matrix 307 Standard Asphalt Primer, by GAF.
    18. Insulation Adhesive: GAF 2-Part Roofing Adhesive by GAF.
    19. Insulation Adhesive: Oly-Bond 500 distributed by GAF.
    20. Insulation Adhesive: Oly-Bond 500 Spot Shot distributed by GAF.
    21. Insulation Adhesive: Oly-Bond 500 Green distributed by GAF.
    22. Insulation Adhesive: Oly-Bond 500 Spot Shot Green distributed by GAF.

\*\* NOTE TO SPECIFIER \*\* It is the responsibility of those involved with the design of the building to obtain indemnification for the attachment and integrity of the Insta-Stik Product. GAF assumes no responsibility for the Insta-Stik product or its performance within the system.

* + 1. Insulation Adhesive: Insta-Stik by Dow Chemical.

\*\* NOTE TO SPECIFIER \*\* Delete rock ballast if not required.

* 1. STONE BALLAST
     1. Stone ballast shall be smooth, water worn gravel with rounded edges and corners, relatively free of sand, loam, and other foreign substances, and contain less than 4 percent fines.

\*\* NOTE TO SPECIFIER \*\* Delete paver ballast if not required.

* 1. PAVER BALLAST
     1. Non-Interlocking Pavers: Commodity precast pavers engineered and fabricated for roof ballast application with drainage channel bottom and shiplap edges.
     2. Interlocking Pavers: Extruded polystyrene insulation panels with integral latex-modified mortar top face, 2 inches (51 mm) thick. Insulated pavers to be provided with tongue and groove interlocking edges, natural gray color.
  2. ACCESSORlES
     1. PLATES AND FASTENERS

\*\* NOTE TO SPECIFIER \*\* Delete mechanical fasteners not required.

* + - 1. Drill•Tec Standard Screws: Standard duty alloy steel insulation fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips head for use on steel and wood decks.
      2. Drill•Tec Heavy Duty ASAP 2S Fastener: Assembled screw and 2" (52 mm) steel barbed plate. Alloy steel fastener with CR-10 coating with a .245" (6.2 mm) diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head.
      3. Drill•Tec Extra Heavy Duty ASAP Fastener: Assembled screw and 2-3/8" (60.3 mm) steel barbed plate. Alloy steel fastener with CR-10 coating with a .275" (6.9 mm) diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head
      4. Drill•Tec ASAP 3P Fastener: Assembled screw and 3" locking plastic plate. Alloy steel fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head.
      5. Dril•Tec ASAP 3S Fastener: Assembled screw and 3" steel plate. Alloy steel fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head.
      6. Drill•Tec HD Screws: Heavy gauge alloy steel fastener with CR-10 coating with a .245" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on wood, concrete and steel decks.
      7. Drill•Tec XHD Screws: Heavy gauge alloy steel fastener with CR-10 coating with a .275" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on heavy steel decks.
      8. Drill•Tec SXHD Screws: Heavy gauge alloy steel fastener with CR-10 coating with a .320" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on specific FM assemblies on heavy steel decks.
      9. Drill•Tec Polymer Screws: A large diameter glass filled nylon auger-type insulation and membrane fastener with a 1" head and with locking wire barbs. Major thread diameter of .750". To be used with 3" (7.6 cm) Steel Round Plate or a 2" (5.1 cm) barbed steel plate, for use on gypsum and cementitious wood fiber decks.
      10. Drill•Tec Spikes: Hammer-in, non-threaded fastener designed to secure insulation and membrane to structural concrete. Alloy steel fastener with a CR-10 coating and a .250 shank diameter.
      11. Dril•Tec Lite-Deck Fastener: A large diameter reinforced nylon screw with a #3 square drive flat head. Thread diameter of .375" and shank diameter of .312". Uses a 3" (7.6 cm) Metal Round Plate fastening system.
      12. Drill•Tec CR Base Sheet Fastener: G-90 galvanized, CR-10 Corrosion resistant coating with 1.125" x1" head and 1 3/4" (4.4 cm) leg length. Preassembled with 2 3/4" (7 cm) diameter Galvalume steel roof disc.
      13. Drill•Tec CR 1.2 Base Sheet Fastener: G-90 galvanized, CR-10 Corrosion resistant coating with 1.125" x1" head and 1.2"leg length. Preassembled with 2 3/4" (7 cm) Diameter Galvalume steel roof disc.
      14. Drill•Tec Insulation Plates: Galvalume, 3" (7.6 cm) diameter, suitable for use with Drill•Tec Standard and HD screws, and Drill•Tec Spikes. Special design available for use with Drill•Tec Polymer Screws.
      15. Drill•Tec XHD Plates: Galvalume, 2 3/8" (6 cm) diameter, with a barbed underside. Suitable for use with Drill•Tec Standard, HD, and XHD Screws, and Drill•Tec Spikes.
      16. Drill•Tec SXHD Plates: Galvalume, 2 3/4" (7 cm) diameter, with a double barbed underside. Required for use with Drill•Tec SXHD Screws, HD Screws and Drill•Tec Spikes for specific FM assemblies.
      17. Drill•Tec SHD Plates: Galvalume, 2" (5.1 cm) diameter, with a double barbed underside. Suitable for use with Drill•Tec Standard, HD, XHD, and SXHD Screws, and Drill•Tec Spikes.
      18. Drill•Tec Lite-Deck Plate: Galvalume, plate with extra wide diameter designed specifically for Lite-Deck Fastener.
      19. Drill•Tec Locking Impact Nail: Factory Assembled, G-90 Galvalume Coated fastener designed to install base sheets or insulation to gypsum or cementitious wood fiber. 1.8" to 4.8" lengths available with a 2.7" diameter plate.
      20. Drill•Tec Purlin Fastener: Alloy steel fastener with CR-10 coating with a .210" diameter thread. Factory Mutual Standard 4470 Approved, 1/4" hex head. For use when mechanically fastening single-ply membranes in metal-retrofit applications.
      21. Threaded Cap Nail: Annular-threaded electro-galvanized with yellow di-chromate coating, with 1" (25 mm) round or square cap, as manufactured by the Simplex Nail Corporation.
      22. Two-Piece Tube Nail: 1" (2.5 cm) diameter cap; when the nail is driven down through the tube of first part that was installed, the nail hooks up to provide backout resistance, as manufactured by The Simplex Corporation.
      23. Nail-Tite Type-R Fasteners: Self-locking one-piece fastener for securing base ply when roofing over existing poured gypsum roof decks. Shank: 1" tapered cone precision formed from corrosion resistant galvanized (G-90) steel. Cap: 1-1/4" round cap formed from corrosion resistant Galvalume (AZ-55) steel, reinforced to resist cupping during driving. The shank is securely wedged to cap forming rigid one-piece fastener, by E. S. Products.
    1. FLASHING ACCESSORlES
       1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. EverGuard TPO Detailing Membrane, by GAF.
       2. An 8 inch (20 cm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green EverGuard TPO Flashing Membrane, by GAF.
       3. Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener. Pre-punched slotted holes at 6" on center or 8" on center.3/4" x 10' with 0.090" cross section, Drill-Tec Termination Bar, by GAF.
       4. A 6 inch (152 mm) wide, 0.045 mil reinforced TPO membrane with a 3-inch self-adhered area and a 3-inch heat-weld area. Designed for use as a cover strip over coated and non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6" X 100'. EverGuard TPO Cover Tape Heat-Weld, by GAF.
       5. A 6 inch (14 cm) wide, smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip with a factory laminated butyl tape. Designed for use as a cover strip over non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6" X 100'. EverGuard TPO Cover Tape, by GAF.

\*\* NOTE TO SPECIFIER \*\* This product is only acceptable for up to 15 year NDL Warranties

* + - 1. .045" reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems. Size 6" x 100', EverGuard RTA (Roof Transition Anchor) Strip, by GAF
      2. Two-part assembly with a rigid extruded termination base plate, and a decorative snap-on fascia cover for single-ply roofs. The system shall have all concealed fasteners with no penetration on horizontal roof surface available in 10' lengths, EverGuard EZ Fascia EX by GAF.
      3. A two-part assembly with a rigid terminator base plate, and a decorative snap-on fascia cover for single-ply roofs with raised perimeter edges. The system shall have all concealed fasteners with no penetration on horizontal roof surface available in 10 foot lengths, EverGuard EZ Fascia by GAF.

\*\* NOTE TO SPECIFIER \*\* This product compatible with 45 and 60 mil TPO only.

* + - 1. Decorative metal fascia with continuous galvanized steel spring cant to terminate single-ply roofing at perimeter. The system shall be watertight with concealed splice plates and no exposed fasteners available in 10' lengths, EverGuard Snap-on Fascia by GAF.
      2. Metal with 0.025" thick TPO based film as required for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. Standard sheet size 4' x 10', sheet weight 47 lbs Available in stainless steel and aluminum, EverGuard TPO Coated Metal, by GAF.
      3. Metal Types: 24 gauge, 20 gauge, stainless steel, aluminum

\*\* NOTE TO SPECIFIER \*\* Select Color - Delete those not required on the project. Available Stock Colors: White Gray Tan Regal Red Regal Blue Hartford Green Available Pre-Formulated Colors: Colonial Red, Dark Brown, Dark Bronze, Desert Tan, Electric Blue, Goldenrod, Ivy Green, Moss Green, Patina Green, Slate Gray, Teal, Terra Cotta, Tropical Green, Smoke Gray, Energy Gray, Energy Tan Custom Colors are available.

* + - * 1. Color: White.
        2. Color: Gray.
        3. Color: Tan.
        4. Color: Regal Red.
        5. Color: Regal Blue.
        6. Color: Hartford Green.
        7. Pre-Formulated Color: Colonial Red.
        8. Pre-Formulated Color: Dark Brown.
        9. Pre-Formulated Color: Dark Bronze.
        10. Pre-Formulated Color: Desert Tan.
        11. Pre-Formulated Color: Electric Blue.
        12. Pre-Formulated Color: Goldenrod.
        13. Pre-Formulated Color: Ivy Green.
        14. Pre-Formulated Color: Moss Green.
        15. Pre-Formulated Color: Patina Green.
        16. Pre-Formulated Color: Slate Gray.
        17. Pre-Formulated Color: Teal.
        18. Pre-Formulated Color: Terra Cotta.
        19. Pre-Formulated Color: Tropical Green.
        20. Pre-Formulated Color: Smoke Gray.
        21. Pre-Formulated Color: Energy Gray.
        22. Pre-Formulated Color: Energy Tan.
        23. Color as Specified by the Architect.
    1. WALL AND CURB ACCESSORlES
       1. 55 mil TPO membrane and 24 gauge coated metal prefabricated into standard and custom size thru wall scuppers. Available in two sizes: 4" x 6" x 12" (l x w x d) with a 5.75" x 3.75" opening and 8" x 10" x 12" (l x w x d) with a 9.75" x 7.75" opening, EverGuard TPO Scupper, by GAF.
       2. .045" or .060" thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs that are 24", 36", 48", and 60" in size. Four corners are required to flash the curb, EverGuard Corner Curb Wraps, by GAF.
       3. 0.060" thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to EverGuard TPO membrane. Size 4" x 4" with 6" flange, EverGuard TPO Universal Corners by GAF.
       4. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to Everguard TPO membrane. Size 6" x 6" x 5.5" high EverGuard TPO Preformed Corners by GAF.
       5. 8" diameter, nominal .050" vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings, EverGuard TPO Fluted Corner, by GAF.
    2. PENETRATION ACCESSORlES
       1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" to 6" diameter pipes), including square tube. Hot-air welded directly to EverGuard TPO membrane, supplied with stainless steel clamping rings, EverGuard TPO Preformed Vent Boots by GAF.
       2. 0.045" or 0.60" thick molded TPO membrane preformed boots are split to accommodate most common pipes and conduits and available in three standard sizes, EverGuard TPO Split Pipe Boots, by GAF.
       3. 0.045" or 0.60" thick molded TPO membrane preformed square boots are split to accommodate most common square penetrations and conduits and available in three standard sizes, EverGuard TPO Square Tube Wraps, by GAF.
       4. .070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations , weldable and 9" x 6" x 4" (l x w x h) . EverGuard TPO Pourable Sealer Pocket.
       5. 24 gauge steel with 0.025" thick TPO based film flanged drain, EverGuard TPO Coated Metal Drain by GAF.
    3. FIELD OF ROOF ACCESSORlES

\*\*NOTE TO SPECIFIER \*\* The next paragraph is for Fully Adhered and Mechanically attached systems only

* + - 1. 1.5" wide x 1.25" high x 10' length profiles with pressure sensitive adhesive. Applied to the TPO roofing systems to simulate standing seam metal roof, EverGuard TPO Architectural Profile, by GAF.
      2. Pre-manufactured expansion joint covers used to bridge expansion joint openings in a roof structure. Fabricated to accommodate all roof to wall and roof to roof applications, made of .060" reinforced TPO membrane, available in 5 standard sizes for expansion joint openings up to 8" wide. EverGuard TPO Expansion Joint Covers, by GAF.
      3. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 and 80 mil membrane applications. EverGuard T-Joint Patches, by GAF.
      4. 1/8" (3.18 mm) thick extruded and embossed TPO roll 30" x 50' (762 mm x 15.2 m), heat welds directly to roofing membrane. Unique herringbone traction surface. Gray in color, EverGuard TPO Walkway Rolls, GAF.

1. EXECUTION
   1. EXAMINATION
      1. Verify that the surfaces and site conditions are ready to receive work.
      2. Verify that the deck is supported and secured.
      3. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.
      4. Verify that the deck surfaces are dry and free of ice or snow.
      5. Verify that all roof openings or penetrations through the roof are solidly set, and that all flashings are tapered.
   2. SUBSTRATE PREPARATION

\*\* NOTE TO SPECIFIER \*\* Delete roof deck type not required.

* + 1. Steel Deck:

\*\* NOTE TO SPECIFIER \*\* FM requirements may supercede those set forth in this section. Consult the current FM Guide for more information.

* + - 1. Metal decks shall be a minimum uncoated thickness of 22 gauge (0.8 mm) and shall have a G-90 galvanized finish on all panels.
      2. Decks shall comply with the gauge and span requirements in the current Factory Mutual FM Approval Guide and be installed in accordance with Loss Prevention Data Sheet 1-28 or specific FM approval.

\*\* NOTE TO SPECIFIER \*\* Delete if re-roofing not required.

* + - 1. When re-roofing over steel decks, surface corrosion shall be removed, and repairs to severely corroded areas made. Loose or inadequately secured decking shall be fastened, and irreparable or otherwise defective decking shall be replaced.
    1. Structural Concrete Deck:
       1. Minimum deck thickness for structural concrete is 4 inches (102 mm).

\*\* NOTE TO SPECIFIER \*\* Concrete decks that are poured over non-vented metal decks or pans that remain in place may trap moisture in the deck beneath the roof system and are not acceptable.

* + - 1. Only poured in place concrete decks that provide bottom side drying are acceptable.
      2. The roof deck shall be properly cured prior to application of the roofing system. Curing agents shall be checked for compatibility with roofing materials. Prior to the installation of the roof assemblies, evaluation of the surface moisture and deck's dryness by the use of ASTM D 4263 or hot bitumen test procedures shall be conducted.
      3. The deck shall be smooth, level and cannot be wet or frozen.
      4. Treat cracks greater than 1/8 inch (3 mm) in width in accordance with the deck manufacturer's recommendations.
      5. Sumps for the roof drains shall be provided in the casting of the deck.
      6. When insulation or roofing is to be adhered with hot asphalt, prime the deck with asphalt/concrete primer, ASTM D 41 at the rate of one gallon per 100 square feet (0.4 l/sm). Allow the primer to dry prior to the application of the roofing system.

\*\* NOTE TO SPECIFIER \*\* Delete if re-roofing not required.

* + - 1. With retrofit roof applications, it is required that the deck be inspected for defects. Defects are to be corrected per the deck manufacturer's recommendations prior to the roofing application.
    1. Wood Deck (Plank / Heavy Timber):

\*\* NOTE TO SPECIFIER \*\* Tongue and groove or shiplap lumber is preferred to square edge material since subsequent shrinkage or warping of square edge planks may cause ridging of the roof system above adjacent boards.

* + - 1. Wood boards shall be at least 1 inch (25 mm) nominal thickness and have a nominal width of 4 feet-6 inches (1.37 m).
      2. All boards shall have a bearing on rafters at each end and be securely nailed.
      3. Lumber shall be kiln dried.
      4. Preservatives or fire retardants used to treat decking shall be compatible with roofing materials.
      5. Decking shall be kept dry and roofed promptly after installation.
      6. Knotholes or large cracks in excess of 1/4 inch (6 mm) shall be covered with securely nailed sheet metal.

\*\* NOTE TO SPECIFIER \*\* Delete if re-roofing not required.

* + - 1. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per the deck manufacturer's recommendations and standards of the APA/Engineered Wood Association prior to new roof application.
    1. Plywood Deck:
       1. Plywood sheathing shall be exterior grade, minimum 4 ply, and not less than 15/32 inch (12 mm) thick.
       2. Preservatives or fire retardants used to treat the decking shall be compatible with roofing materials.
       3. The deck shall be installed over joists that are spaced 24 inches (610 mm) o.c. or less.
       4. The deck shall be installed so that all four sides of each panel bear on and are secured to joist and cross blocking. "H" clips are not acceptable.
       5. Panels shall be installed with a 1/8 inch to 1/4 inch (3 mm to 6 mm) gap between panels and shall match vertically at joints to within 1/8 inch (3 mm).
       6. Decking shall be kept dry and roofed promptly after installation.
    2. Oriented Strand Board (OSB) Deck:
       1. Oriented Strand Board shall carry a Structural 1 rating when used as a decking material.
       2. Preservatives or fire retardants used to treat decking shall be compatible with roofing materials.
       3. The deck shall be installed over joists that are spaced 24 inches (610 mm) o.c. or less.
       4. The deck shall be installed so that all four sides of each panel bear on and are secured to joist and cross blocking; the APA/Engineered Wood Association (APA) recommendations. "H" clips are not acceptable.
       5. Panels shall be installed with a 1/8 inch to 1/4 inch (3 mm to 6 mm) gap between panels and shall match vertically at joints to within 1/8 inch (3 mm).
       6. Decking shall be kept dry and roofed promptly after installation.
    3. Lightweight Insulating Concrete Deck:

\*\* NOTE TO SPECIFIER \*\* Individual deck manufacturer's standards apply when their specifications exceed the minimum thickness, compressive strength, or density requirements.

* + - 1. Lightweight insulating concrete decks are required to have a minimum thickness of 2 inches (51 mm), a minimum compressive strength of 125 psi (0.86 MPa) and a minimum density of 22 pcf (352 kg/sm).
      2. The lightweight insulating deck/fill shall be installed by an applicator approved by the deck manufacturer.
      3. The roof system shall be installed immediately following deck curing to prevent damage from exposure to precipitation. The deck manufacturer determines the minimum curing time and maximum exposure limitations.
      4. LWIC shall not be poured during rainy periods. Deck areas that have frozen before they have cured shall be removed and replaced. Decks which receive precipitation prior to installation of the roof membrane shall be checked for moisture content and dryness.
      5. The moisture content of existing LWIC shall be under 20 percent when insulation is to be fastened directly to it. Where moisture content exceeds 20 percent, a layer of Stratavent Eliminator Venting Base Sheet shall be installed prior to the insulation.
      6. Where the mean January temperature (Reference current ASHRAE Fundamentals Handbook) is below 40 degrees F (4.4 degrees C), lightweight insulating concrete decks shall be poured and roofed between April 1 and October 31. This type of deck is unacceptable in Alaska.
      7. Lightweight insulating concrete decks are acceptable only on slopes up to 1 inch per foot (83 mm/m).
    1. Cementitious Wood Fiber:
       1. Decks shall be protected from the weather during storage and application; any wet or deformed decking shall be removed and replaced.
       2. Cementitious wood fiber decks shall not be installed over high humidity occupancies.
       3. Cementitious wood fiber decks shall have a minimum design load as recommended by the manufacturer.
       4. All cementitious wood fiber deck panels shall be anchored against uplift and lateral movement.
       5. The deck shall be installed level. Any deflection, irregularities, or otherwise damaged panels shall be corrected or replaced.
    2. Gypsum:
       1. Gypsum decks shall be smooth and free from deflections or ridges.
       2. When installing base sheet fasteners, an average fastener withdrawal resistance as recommended by the fastener manufacturer shall be obtained; however, at no time shall it be less than 40 lb (178 N) per fastener.
       3. Wet or frozen poured gypsum decks are not suitable to receive a roof.
       4. Poured-in-place gypsum roof decks contain a large percentage of moisture. All necessary precautions shall be taken to avoid the entrapment of moisture under the roofing system. In addition to ventilation of the underside to allow for proper curing, topside and perimeter venting shall be implemented.
    3. Recover:
       1. Roofs for recover shall be free of dust, dirt, debris, and any contaminants that may adversely affect the performance of the new roof. Areas of substantial deck deflection or membrane imperfections shall be corrected prior to installing any new roofing.
       2. For recover installations over single-ply, fluid applied, coal tar and metal roofs, contact GAF Contractor Services for prior approval and technical requirements.

\*\* NOTE TO SPECIFIER \*\* It is highly recommended and in certain circumstances, required, that a moisture survey be made to determine the extent of wet insulation and moisture entrapment. Contact GAF Contractor Services for more information on moisture surveys.

* + - 1. Taking test cuts to verify the existing roof construction and condition. Three test cuts shall be made for roofs under 100 squares (930 sm) and one test cut per 100 squares (930 sm) above the minimum amount.
      2. Existing substrates and insulation (if applicable) shall be dry over the majority of the roof area. Wet or deteriorated areas of insulation and substrate shall be removed and replaced with new materials. When adhering insulation or new roofing directly to the existing roof surface, the existing roof system components shall be well attached to each other and their substrate.
      3. All applicable code requirements shall be met for recover over an existing roofing system.

\*\* NOTE TO SPECIFIER \*\* GAF does not recommend partial recover or re-roofing of a single roof area due to the potential for defects in the portion of the roof system not replaced or negatively affecting the performance of the new membrane. When required by project conditions or budget considerations, GAF requires full separation of the old and new roof areas by means of a full curb mounted expansion joint or area divider installed to provide a complete watertight seal or break between areas. Tie-in constructions, in which the old and new membranes are adhered directly to each other and stripped in are not acceptable for coverage under certain guarantees.

* 1. INSTALLATION - GENERAL
     1. Install GAF's EverGuard TPO roofing system according to all current application requirements in addition to those listed in this section.

\*\* NOTE TO SPECIFIER \*\* Provide selected specification number if required. Delete if provision not used.

* + 1. GAF EverGuard Specification #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    2. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

\*\* NOTE TO SPECIFIER \*\* Insulation bitumen. Delete if not required.

* 1. BITUMEN HANDLING
     1. Do not mix different types of asphalt.
     2. Do not heat the asphalt to or above its flash point or hold the asphalt at temperatures above the finished blowing temperature for more than 4 hours.
     3. Do not keep heated tankers above 325 degrees F (163 degrees C) overnight.

\*\* NOTE TO SPECIFIER \*\* Permate vapor retarder. Delete if not required.

* 1. VAPOR RETARDER
     1. General:
        1. Air/vapor barrier sheet shall typically be installed when required by design professional to address internal air pressure or humidity conditions.
        2. Insulation must be installed over the air/vapor barrier sheet and mechanically attached to the deck.
     2. Application:
        1. Install air/vapor barrier sheet loose-applied to the deck or fire board so that wrinkles and buckles are not formed.
        2. Overlap air/vapor barrier sheets a minimum of 6" for side and end laps. Tape laps together with duct tape or double sided tape.
        3. Seal perimeter and penetration areas with foam sealant.

\*\* NOTE TO SPECIFIER \*\* Insulation. Delete if not required.

* 1. INSULATION - GENERAL
     1. Do not apply roof insulation or roofing until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment. A vapor retarder coated lightly with asphalt may be applied to protect the inside of the structure prior to the insulation and final roofing installation. Before the application of the insulation, any damage or deterioration to the vapor retarder shall be repaired.
     2. Do not install wet, damaged or warped insulation boards.
     3. Install insulation boards with staggered board joints in one direction (unless taping joint).
     4. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). All gaps in excess of 1/4 inch (6 mm) shall be filled with like insulation material.
     5. Wood nailers shall be 3-1/2 inches (89 mm) minimum width or 1 inch (25 mm) wider than metal flange. They shall be of equal thickness as the insulation with a minimum 1 inch (25 mm) thickness. All nailers shall be securely fastened to the deck.
     6. Do not kick insulation boards into place.
     7. 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.
     8. Insulation shall not be installed over new lightweight insulating concrete.
     9. Roof tape, if required over insulation joints, shall be laid evenly, smoothly and embedded in a uniform coating of hot steep asphalt with 4 inches (102 mm) end laps. Care shall be taken to assure smooth application of tape, and full embedment of the tape in the asphalt.
     10. Do not install any more insulation than will be completely waterproofed each day.
  2. INSULATION - BASE LAYER

\*\* NOTE TO SPECIFIER \*\* Mechanically fastened. Delete if not required.

* + 1. The insulation shall be securely attached to the roof deck. A minimum FMRC 1-60 attachment is recommended. Refer to FMRC Approval Guide for FM fastening patterns. Factory Mutual requires fastener density increased in corner areas for FM 1-60 and perimeter, and corner area fastener density increases for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-7, 1-28, and 1-49.
    2. Use only fasteners with a minimum 3 inch (76 mm) stress plate when mechanically attaching insulation. Do not attach insulation with nails.

\*\* NOTE TO SPECIFIER\*\* Foam Adhesive application. Delete the next two paragraphs if not required.

* + - 1. The substrate must be free of and debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
      2. If using foam adhesive in boxes, must be applied using the specially designed dispenser. Foam adhesive in cartridge format shall be applied using one of the specially designed dual cartridge dispensers.

\*\* NOTE TO SPECIFIER\*\* LRF ADHESIVE application. Delete the next two paragraphs if not required.

* + - 1. Apply bands of LRF adhesive spaced 6" to 12" (152 mm to 305 mm) o.c. Allow the foam to rise 3/4" to 1" (19.1 mm to 25.4 mm). Install installation boards. Walk each board firmly into place. Stagger the joints of additional layers in relation to the insulation joints in the layer(s) below by a minimum of 6" (152 mm) to eliminate continuous vertical gaps. Repeat for each layer.
      2. Do not install any more insulation than will be completely waterproofed each day.

\*\* NOTE TO SPECIFIER\*\* GAF 2-Part Adhesive application. Delete the next two paragraphs if not required.

* + - 1. Apply heavily textured spatter pattern coat 1/4" to 1/2" (6.4 mm to 13 mm) nominal thickness in height. Place insulation boards immediately in place. Do NOT walk in place or compress for 5 to 10 minutes depending on ambient temperature. Refer to product application instructions for specific times.
      2. Do not install any more insulation than will be completely waterproofed each day.

\*\* NOTE TO SPECIFIER \*\* Asphalt Adhered. Delete if not required.

* + 1. Install insulation layers, maximum 4 feet by 4 feet (1.22 m by 1.22 m) board size, in a full and uniform mopping of hot asphalt applied at the rate of 25 lb/square (1.2 kg/sm) 20 percent. Press each board firmly into place. 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) to eliminate continuous vertical gaps.

\*\* NOTE TO SPECIFIER \*\* Oly Bond. Delete if not required.

* + 1. The substrate shall be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
    2. Install insulation layers applied with beads of Oly Bond 500 spaced 12 inches (305 mm) O.C. Approximate coverage rate is one (1) gallon per 100 square feet (0.42 l/sm), depending on the substrate. Allow the foam to rise 1/2 inch to 3/4 inch (13 mm to 19 mm). Press each board firmly into place. 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) to eliminate continuous vertical gaps.

\*\* NOTE TO SPECIFIER \*\* Insta-Stik. Delete if not required.

* + 1. The substrate shall be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
    2. Install insulation layers applied with 3/4 inch (19 mm) beads of Insta-Stik spaced 12 inches (305 mm) O.C. Press each board firmly into place. 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) to eliminate continuous vertical gaps.

\*\* NOTE TO SPECIFIER \*\* Loose Laid. Delete if not required.

* + 1. Loose lay the base layer of insulation for subsequent layers to be simultaneously attached. Minimal fastening shall be performed to avoid movement of the boards.
  1. INSULATION - SUBSEQUENT LAYERS

\*\* NOTE TO SPECIFIER \*\* Simultaneous Attachment. Delete if not required.

* + 1. The insulation shall be securely attached to the roof deck. A minimum FMRC 1-60 attachment is recommended. Refer to FMRC Approval Guide for FM fastening patterns. Factory Mutual requires fastener density increased in corner areas for FM 1-60 and perimeter, and corner area fastener density increases for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-7, 1-28, and 1-49.
    2. Multiple layers of insulation of the same, non-tapered insulation material may be simultaneously mechanically fastened with approved fasteners and plates through the top layer of insulation to the structural deck. Individual layers of insulation shall not exceed 3 inches (7.6 mm) in thickness nor total thickness of all layers shall not exceed 5 inches (127 mm) without written approval of GAF Contractor Services.

\*\* NOTE TO SPECIFIER \*\* Mechanically fastened. Delete if not required.

* + 1. Use only fasteners with a minimum 3 inch (76 mm) stress plate when mechanically attaching insulation. Do not attach insulation with nails.

\*\* NOTE TO SPECIFIER\*\* Foam Adhesive application. Delete the next two paragraphs if not required.

* + - 1. The substrate must be free of and debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
      2. If using foam adhesive in boxes, must be applied using the specially designed dispenser. Foam adhesive in cartridge format shall be applied using one of the specially designed dual cartridge dispensers.

\*\* NOTE TO SPECIFIER\*\* LRF ADHESIVE application. Delete the next two paragraphs if not required.

* + - 1. Apply bands of LRF adhesive spaced 6" to 12" (152 mm to 305 mm) o.c. Allow the foam to rise 3/4" to 1" (19.1 mm to 25.4 mm). Install installation boards. Walk each board firmly into place. Stagger the joints of additional layers in relation to the insulation joints in the layer(s) below by a minimum of 6" (152 mm) to eliminate continuous vertical gaps. Repeat for each layer.
      2. Do not install any more insulation than will be completely waterproofed each day.

\*\* NOTE TO SPECIFIER\*\* GAF 2-Part Adhesive application. Delete the next two paragraphs if not required.

* + - 1. Apply heavily textured spatter pattern coat 1/4" to 1/2" (6.4 mm to 13 mm) nominal thickness in height. Place insulation boards immediately in place. Do NOT walk in place or compress for 5 to 10 minutes depending on ambient temperature. Refer to product application instructions for specific times.
    1. Do not install any more insulation than will be completely waterproofed each day.

\*\* NOTE TO SPECIFIER \*\* Asphalt Adhered. Delete if not required.

* + 1. Install insulation layers, maximum 4 feet by 4 feet (1.22 m by 1.22 m) board size, in a full and uniform mopping of hot asphalt applied at the rate of 25 lb/square (1.2 kg/sm) 20 percent. Press each board firmly into place. 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) to eliminate continuous vertical gaps.

\*\* NOTE TO SPECIFIER \*\* Oly Bond. Delete if not required.

* + 1. The substrate shall be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
    2. Install insulation layers applied with beads of Oly Bond 500 spaced 12 inches (305 mm) O.C. Approximate coverage rate is one (1) gallon per 100 square feet (0.42l/sm), depending on the substrate. Allow the foam to rise 1/2 inch to 3/4 inch (13 mm to 19 mm). Press each board firmly into place. 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) to eliminate continuous vertical gaps.

\*\* NOTE TO SPECIFIER \*\* Insta-Stik. Delete if not required.

* + 1. The substrate shall be free of debris, dust, dirt, oil, grease, and standing water before applying the adhesive.
    2. Install insulation layers applied with 3/4 inch (19 mm) beads of Insta-Stik spaced 12 inches (305 mm) O.C. Press each board firmly into place. 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) to eliminate continuous vertical gaps.
    3. Do not install any more insulation than will be completely waterproofed each day.
  1. PROTECTION LAYER
     1. Polymat protection layer shall be installed between the roofing membrane and the substrate.
     2. Fire sheet 50 or 10 fiberglass sheet protection layer shall typically be installed when required by design professionals or code authority to address code or approval requirements or as a separator layer.
     3. Install fiberglass sheet or polymat protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
     4. Overlap sheets a minimum of 6" for side and end laps.

\*\* NOTE TO SPECIFIER \*\* Available For Mechanically Attached Systems Only. Delete if not Required.

* 1. VERSASHIELD SOLO
     1. Install VersaShield Solo loose-applied over substrate surface so that wrinkles and buckles are not formed perpendicular to the direction of the TPO membrane.
     2. Overlap membrane a minimum 2 " at the side laps and minimum 4" at the end laps.
     3. Use corrosive resistant nails with 1" diameter metal head or plastic caps to fasten in place.
     4. Only use enough fasteners to hold in place until primary roof covering is in place.
     5. Do not install more VersaShield Solo than can be covered in one day.
  2. MEMBRANE APPLICATION

\*\* NOTE TO SPECIFIER \*\* Fully Adhered application. Delete if not required.

* + 1. Fully Adhered (Adhesive):
       1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be fully adhered immediately after it is rolled out, followed by welding to adjacent sheets.
       2. Overlap roof membrane a minimum of 3" (15 cm) for side laps and 3" (15 cm) for end laps.
       3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
       4. All exposed sheet corners shall be rounded a minimum of 1".
       5. Use full width rolls in the field and perimeter region of roof.
       6. Use appropriate bonding adhesive for substrate surface, applied with a solvent-resistant roller, brush or squeegee.

\*\* NOTE TO SPECIFIER\*\* Foam Adhesive application. Delete the next two paragraphs if not required.

* + - 1. All work surfaces should be clean, dry, and free of dirt, dust, debris, oils, loose and/or embedded gravel, un-adhered coatings, deteriorated membrane, and other contaminants that may result in a surface that is not sound or is uneven.
      2. Apply LRF Adhesive directly to the substrate using a ribbon pattern. Space beads as required by job specification, typically 6" or 12" (152 mm or 305 mm) o.c.
      3. GAF LRF M Adhesive should be approximately 70&#176;F (22&#176;C) when being dispensed. As adhesive is applied, allow the adhesive to begin rising, then place membrane.
      4. Roll in membrane using a 150 lb. membrane roller or equivalent.

\*\* NOTE TO SPECIFIER \*\* Smooth Membrane application. Delete if not required.

* + - 1. Apply bonding adhesive at 3 squares of finished, mated surface area per 5 gallons (Solvent Based) and 5 squaresof finished, mated surface area per 5 gallons (Water Based). A greater quantity of bonding adhesive may be required based upon the substrate surface condition.

\*\* NOTE TO SPECIFIER \*\* Fleece Backed Membrane application. Delete if not required.

* + - 1. Apply bonding adhesive to the substrate surface only at 300 square feet per 5 gallons (Solvent Based) and 600 square feet per 5 gallons (Water Based). A greater quantity of bonding adhesive may be required based upon the substrate surface condition.
      2. Prevent seam contamination by keeping the adhesive application a few inches back from the seam area.
      3. Adhere approximately one half of the membrane sheet at a time. One half of the sheet's length shall be folded back in turn to allow for adhesive application. Lay membrane into adhesive once the bonding adhesive is tacky to the touch.
      4. Roll membrane with a weighted roller to ensure complete bonding between adhesive and membrane.
      5. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
      6. Weld shall be a minimum of 1-1/2" in width for automatic machine welding and a minimum 2" in width for hand welding.
      7. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
      8. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than five (5) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with appropriate Drill-Tec screws and plates spaced every 12" o.c. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
      9. Supplemental membrane attachment to the structural deck is required at all penetrations unless the insulation substrate is fully adhered to the deck. Roofing membrane shall be secured to the deck with appropriate Drill-Tec screws and plates.
      10. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
      11. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

\*\* NOTE TO SPECIFIER \*\* Hot Asphalt application. Delete if not required.

* + 1. Fully Adhered (Hot Asphalt):
       1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be fully adhered immediately after it is rolled out, followed by welding to adjacent sheets.
       2. Overlap roof membrane a minimum of 3" (15 cm) for side laps and 3" (15 cm) for end laps.
       3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
       4. All exposed sheet corners shall be rounded a minimum of 1".
       5. Use full width rolls in the field and perimeter region of roof.
       6. Fully adhere membrane sheets to the substrate with hot roofing asphalt at a rate of 25 lbs per 100 square feet.
       7. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.
       8. Adhere approximately one half of the membrane sheet at a time. One half of the sheet's length shall be folded back in turn to allow for asphalt application. Lay membrane into asphalt immediately after application.
       9. Roll membrane with a weighted roller to ensure complete bonding between asphalt and membrane.
       10. Membrane laps shall be hot-air-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
       11. Weld shall be a minimum of 1-1/2" in width for automatic machine welding and a minimum 2" in width for hand welding.
       12. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
       13. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than five (5) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with appropriate Drill-Tec screws and plates spaced every 12" o.c. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
       14. Supplemental membrane attachment to the structural deck is required at all penetrations unless the insulation substrate is fully adhered to the deck. Roofing membrane shall be secured to the deck with appropriate Drill-Tec screws and plates.
       15. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
       16. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

\*\* NOTE TO SPECIFIER \*\* Mechanically Attached application. Delete if not required.

* + 1. Mechanically Attached:
       1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
       2. Overlap roof membrane a minimum of 6" for side laps and 3" for end laps.
       3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
       4. All exposed sheet corners shall be rounded a minimum of 1".
       5. Use full width rolls in the field of roof and half width rolls in the perimeter and corner region of the roof and mechanically fastened in the side lap area to the roof deck.
       6. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
       7. Weld shall be a minimum of 1-1/2" in width for automatic machine welding and a minimum 2" in width for hand welding.
       8. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
       9. The membrane shall be mechanically fastened in the side lap area to the roof deck with appropriate Drill-Tec fasteners and plates as required by roof system specification and/or Factory Mutual classification requirements.
       10. The metal plates must be placed within 1/4" to 1/2" of the membrane edge. Plates shall not be placed less than 1/4" from the membrane edge.
       11. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8" (40.5 cm) wide EverGuard TPO reinforced membrane flashing-strip welded over the additional fasteners. Corners include both outside and inside corners that measure 75 - 105 angle degrees.
       12. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of five (5) angle degrees (1" in 12").
       13. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than ten (10) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with screws and plates of the same type and spacing used for in-lap attachment. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
       14. Supplemental membrane attachment to the structural deck is required at all penetrations. Roofing membrane shall be secured to the deck with appropriate Drill-Tec screws and plates.
       15. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
       16. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

\*\* NOTE TO SPECIFIER \*\* Metal Retrofit application. Delete if not required.

* + 1. Mechanically Attached Metal Retrofit System
       1. Unroll the EverGuard TPO membrane and allow to relax at least 30 minutes before installing membrane.
       2. Attach a 6' wide membrane (based on a typical purlin spacing of 5'-0" on center) by fastening the edge of the TPO membrane into the steel purlins with Drill-Tec Purlin Fasteners and 2 " double barbed XHD metal plates a maximum of 12" o.c. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
       3. For purlin spacing other than 5'-0" o.c., please contact GAF Contractor Services at 800/766-3411.
       4. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
       5. Overlap roof membrane a minimum of 5" (25 cm) for side laps and 3" (15 cm) for end laps.
       6. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
       7. All exposed sheet corners shall be rounded a minimum of 1".
       8. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
       9. Weld shall be a minimum of 1-1/2" in width for automatic machine welding and a minimum 2" in width for hand welding.
       10. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
       11. The metal plates must be placed within 1/4" to 1/2" of the membrane edge. Plates shall not be placed less than 1/4" from the membrane edge.
       12. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of five (5) angle degrees (1" in 12").
       13. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than ten (10) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with screws and plates of the same type and spacing used for in-lap attachment. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.

\*\* NOTE TO SPECIFIER \*\* Ballasted application. Delete if not required.

* + 1. Ballast Applied:
       1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
       2. Overlap roof membrane a minimum of 3" (15 cm) for side laps and 3" (15 cm) for end laps.
       3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
       4. All exposed sheet corners shall be rounded a minimum of 1".
       5. Use full width rolls in the field of roof and perimeter of the roof.
       6. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
       7. Weld width shall be a minimum of 1-1/2" in width for automatic machine welding. Weld width shall be a minimum 2" in width for hand welding.
       8. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
       9. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than ten (10) degrees (2" in 12"). Roofing membrane shall be secured to the structural deck with appropriate Drill-Tec screws and plates spaced every 12" o.c. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
       10. Supplemental membrane attachment to the structural deck is required at all penetrations. Roofing membrane shall be secured to the deck with appropriate Drill-Tec screws and membrane plates.
       11. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
       12. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

\*\* NOTE TO SPECIFIER \*\* Self-adhered Rapid Seam Lap application. Delete if not required.

* + 1. Self Adhered with Rapid Seam Membrane Attachment
       1. Position the EverGuard Freedom RS membrane over the approved substrate without stretching.
       2. Unroll the 50 foot (15.24 m) roll of the EverGuard Freedom TPO RS panel at the starting point of the roof with the selvage edge on the downslope side of the roll to facilitate proper lapping of the seams (shingle lapped) when using hot air welded seams. Place the EverGuard Freedom TPO RS membrane panel at the starting point of the roof with the selvage edge on the upslope side of the roll. Fold the membrane in half longitudinally exposing the split in the release liner.
       3. Peel the half of the release liner from the adhesive film back of the membrane and lay to the side of the panel (do not cut release liner).
       4. Roll the membrane with the exposed adhesive onto the EverGuard approved substrate in line with the original layout position. Maintain a full roll radius when rolling out to avoid creating wrinkles.
       5. Roll the EverGuard Freedom TPO Self Adhering membrane back to the point that the release liner becomes accessible and peel the remaining release liner from the adhesive film on the rest of the roll.
       6. Using either a water-filled lawn roller to apply pressure or a stiff bristle push broom, roll/broom in the installed section of EverGuard Freedom TPO Self Adhering membrane to promote maximum adhesion to the substrate. This installed area will be the anchor point and alignment guide for the installation of the remainder of the roll. Rolling or brooming in the width direction of the panel will aid in keeping the membrane from creating wrinkles in the sheet.
       7. For the 2nd and subsequent panels laid out, unroll the membrane and allow to relax as long as necessary depending on ambient conditions. Position the top membrane to overlap the bottom membrane 6" minimum ensuring the lap is installed shingle fashion to prevent backwater laps.
       8. Fold back the 6 inch (152 mm) seam area of the overlapping membrane panel. Use the layout marks on the deck membrane and the selvage edge of the folded back membrane as reference points to ensure proper application of the EverGuard TPO Primer (if the seam area has been contaminated with dirt a pre-cleaning with EverGuard TPO Cleaner is required).
       9. Stir EverGuard TPO Primer thoroughly before using. DO NOT THIN! Using a scrub pad, apply an even coat of primer to the seam areas of the membrane at the rate of 200 sf per gallon. Avoid globs and puddles. Allow primer to dry completely to a dry finger touch.
       10. Remove the release paper from the lap area of the membrane. Gently roll the overlapped membrane with the exposed adhesive carefully onto the membrane below.
       11. Using a 2 inch (51 mm) silicone coated roller, apply pressure in the 6 inch (152 mm) seam area. Roll the seam area at a 45 degree angle to the seam as well as parallel and perpendicular to the seam.
       12. After the seam is assembled fold half the membrane panel back and remove half of the release liner from the EverGuard Freedom TPO RS membrane.
       13. After removing this portion of the release liner from the membrane, start in the middle of the membrane panel and roll the membrane onto the roof substrate being careful to maintain a rounded roll in the membrane being applied and progressing from the center of the panel to the panel ends -do not try to push the entire panel onto the substrate at once or you may cause wrinkles in the roofing membrane.
       14. Using either a water-filled lawn roller or a stiff bristle push broom to apply pressure, roll/broom the membrane surface in order to achieve maximum adhesion to the roof substrate. The rolling/brooming motion should be across the short dimension of the membrane panel in order to avoid creating wrinkles in the EverGuard Freedom TPO RS membrane panel.
       15. Roll remaining half of the EverGuard Freedom TPO RS membrane back over the previously adhered portion and remove the remaining release liner completely exposing the adhesive. Carefully roll the exposed membrane panel onto the substrate and roll or brush the panel to promote maximum adhesion.
       16. Apply adjoining sheets in same manner, lapping edges using pre-printed layout lines.
       17. Any wrinkles that impede the flow of water drainage, must be cut out, laid flat and repaired using EverGuard TPO Cover Tape following standard repair procedures.
       18. EverGuard Freedom TPO RS panels may be spliced together end to end in order to cover runs greater than 50' using an end lap. Because Self Adhering panels only have one selvage edge, panel lap joints must be overlaid with either EverGuard TPO Cover Tape or an 8" wide EverGuard TPO Flashing Strip. Regardless of the type of strip-in material used, the strip-in flashing must cover the entire lap joint and extend three inches onto the adjacent panels at both ends of the lap joint (if using the EverGuard TPO Flashing Strip, the entire flashing strip must be hot air welded to the membrane).

\*\* NOTE TO SPECIFIER \*\* Self-adhered HW Lap application. Delete if not required.

* + 1. Self Adhered Heat Weld Membrane Attachment
       1. Unroll the 50 (15.24 m) roll of the EverGuard Freedom HW panel at the starting point of the roof. Remove the 3 inch (76 mm) selvedge edge that does not contain adhesive on the underside, and position the sheet so the factory edge is along the upslope side of the roll.
       2. Position the EverGuard Freedom TPO HW membrane over the approved substrate without stretching.
       3. Fold the membrane longitudinally and peel approximately one-half of the release liner from the adhesive film back of the membrane and lay to the side of the panel (do not cut release liner).
       4. Roll the membrane with the exposed adhesive onto the approved substrate in line with the original layout position. Maintain a rounded radius at the fold to avoid creating wrinkles.
       5. Roll the EverGuard Freedom membrane back to the point that the release liner becomes accessible and peel the remaining release liner from the adhesive film on the rest of the roll.
       6. Using either a water-filled lawn roller to apply pressure or a stiff bristle push broom, roll/broom in the installed section of EverGuard Freedom membrane to promote maximum adhesion to the substrate. This installed area will be the anchor point and alignment guide for the installation of the remainder of the roll. Rolling or brooming in the width direction of the panel will aid in avoiding the creation of wrinkles in the sheet.
       7. 6 inch minimum (152 mm) end lap joints must be overlaid with EverGuard TPO Cover Tape or EverGuard Flashing Strips. The cover tape or strip-in flashing must cover the entire lap joint and extend 3 inch (76 mm) onto the adjacent sheets at both ends of the lap joints. When using flashing strips, the entire strip must be hot-air welded to the membrane.
       8. For the 2nd and subsequent panels, unroll the membrane and allow to relax as long as necessary depending on ambient conditions. Position the top membrane to overlap the bottom membrane 3" while ensuring the lap is installed shingle-fashion to prevent backwater laps.
       9. Using a clean rag saturated with EverGuard TPO Cleaner, thoroughly clean an area on both sheets at least 3 inch (76 mm) wide if seam area has become contaminated with dirt, debris, etc. Change rags frequently to avoid depositing previously removed materials and allow to dry.
       10. Using an approved automatic heat welding machine or hand held heat gun and silicone roller, continuously weld a minimum 1-1/2 inch (38 mm) wide seam. GAF recommends that only Robotic Automatic Walker Welders be used to weld all field seams.
       11. All welded seams must be manually checked for voids or seam deficiencies by probing the entire seam area with a blunted cotter key extractor after the seam has cooled. In addition, there must be destructive seam cuts taken daily at the job start and every time there is an interruption in the welding process (i.e., Power failure, welder shut down, change in job site conditions and after lunch). All deficiencies must be repaired.
       12. Once the seam is hot air welded so that the sheet is stabilized, fold half the membrane panel back onto the original membrane panel and remove the exposed half of the release liner from the EverGuard Freedom HW membrane.
       13. After removing this half of the release liner from the membrane, start in the middle of the membrane panel and roll the membrane onto the roof substrate being careful to maintain a rounded roll in the membrane being applied and progressing from the center of the panel to the panel ends -do not try to push the entire panel onto the substrate at once or you may cause wrinkles in the roofing membrane.
       14. Using either a water-filled lawn roller or a stiff bristle push broom to apply pressure, roll/broom the membrane surface in order to achieve maximum adhesion to the roof substrate. The roller/brooming motion should be across the short dimension of the membrane panel in order to avoid creating wrinkles in the EverGuard Freedom HW membrane panel.
       15. Roll back the remaining half of the EverGuard Freedom HW membrane and completely remove the remainder of the release liner before allowing the rest of the panel to be carefully rolled onto the substrate. Roll or broom this half of the membrane panel to promote maximum adhesion to the substrate before proceeding with subsequent panels.
       16. Apply adjoining sheets in same manner, lapping panel edges 3" minimum.
       17. Any wrinkles that impede the flow of water drainage must be cut out, laid flat and repaired using standard EverGuard repair procedures.

\*\* NOTE TO SPECIFIER \*\* OPTION 1 ~ GENERAL - ARCHITECT. Delete if not required.

* 1. FLASHINGS
     1. All penetrations shall be at least 2 feet (610 mm) from the curbs, walls, and edges to provide adequate space for proper flashing.
     2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
     3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
     4. Hot-air weld all flashing membranes, accessories, and coated metal. A minimum 2" wide hand weld or minimum 1 - 1/2" automatic machine weld is required.
     5. Non-coated metal edge details shall be installed in accordance with current EverGuard construction details and requirements.

\*\* NOTE TO SPECIFIER \*\* Delete if 20 year warranty not required. Consult the EverGuard Application and Specifications Manual or GAF Contractor Services for more information on specific construction details.

* + 1. Twenty (20) year EverGuard systems require the use of coated metal edges where applicable. Bonding adhesive and/or cover tape is not acceptable.
    2. All cut edges of reinforced membrane shall be sealed with EverGuard TPO Cut Edge Sealant.

\*\* NOTE TO SPECIFIER \*\* OPTION 2 ~ DETAILED - CONTRACTOR. Delete if not required.

* 1. FLASHINGS
     1. General:
        1. All penetrations must be at least 24 inches (610 mm) from curbs, walls, and edges to provide adequate space for proper flashing.
        2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
        3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
        4. Hot-air weld all flashing membranes, accessories, and coated metal. A minimum 2 inch (51 mm) wide (hand welder) weld is required.
        5. All cut edges of reinforced membrane must be sealed with EverGuard TPO Cut Edge Sealant.
        6. Consult the EverGuard Application and Specifications Manual or GAF Contractor Services for more information on specific construction details, or those not addressed in this section.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Coated Metal Flashings:
       1. Coated metal flashings shall be formed in accordance with current EverGuard construction details and SMACNA guidelines.
       2. Coated metal sections used for roof edging, base flashing and coping shall be butted together with a 1/4 inch (6 mm) gap to allow for expansion and contraction. Hot-air weld a 6 inch (152 mm) wide reinforced membrane flashing strip to both sides of the joint, with approximately 1 inch (25 mm) on either side of the joint left un-welded to allow for expansion and contraction. 2 inch (51 mm) wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.
       3. Coated metal used for sealant pans, scupper inserts, corners of roof edging, base flashing and coping shall be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Hot-air weld a 6" wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.
       4. Provide a 1/2 inch (12 mm) hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
       5. Provide a 1/2 inch (12 mm) hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
       6. Coated metal flashings shall be nailed to treated wood nailers or otherwise mechanically attached to the roof deck, wall or curb substrates, in accordance with construction detail requirements.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Un-reinforced Membrane Flashings:
       1. Un-reinforced membrane is used to field-fabricate penetration or reinforcement flashings in locations where preformed corners and pipe boots cannot be properly installed.
       2. Penetration flashings constructed of un-reinforced membrane are typically installed in two sections, a horizontal piece that extends onto the roofing membrane and a vertical piece that extends up the penetration. The two pieces are overlapped and hot-air welded together.
       3. The un-reinforced membrane flashing shall be adhered to the penetration surface. Apply bonding adhesive at a rate resulting in 60 square feet/gallon of finished roofing material for solvent-based bonding adhesives, and at a rate of 125 square feet/gallon of finished roofing material for water-borne bonding adhesive. Apply bonding adhesive to both the underside of the membrane and the substrate surface at 120 square feet per gallon (Solvent Based) and 250 square feet per gallon (Water Based). A greater quantity of bonding adhesive may be required based upon the substrate surface condition. The bonding adhesive must be allowed to dry until tacky to the touch before flashing membrane application.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Reinforced Membrane Flashings:
       1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.
       2. Membrane flashing may either be installed loose or fully adhered to the substrate surface in accordance with "Construction Detail Requirements".
       3. Where flashings are to be fully adhered, apply bonding adhesive at a rate resulting in 60 square feet/gallon of finished roofing material for solvent-based bonding adhesives, and at a rate of 125 square feet/gallon of finished roofing material for water-borne bonding adhesive. Apply bonding adhesive to both the underside of the membrane and the substrate surface at 120 square feet per gallon (Solvent Based) and 250 square feet per gallon (Water Based). A greater quantity of bonding adhesive may be required based upon the substrate surface condition. The bonding adhesive must be allowed to dry until tacky to the touch before flashing membrane application.
       4. Apply the adhesive only when outside temperature is above 40 degrees F. Recommended minimum application temperature is 50 degrees F to allow for easier adhesive application.
       5. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
    2. Self-Adhered Membrane Flashings:
       1. Install self-adhering membrane flashings according to all applicable GAF construction details.
       2. Apply flashing membrane only when outside temperature is above 40 degrees F. Recommended minimum application temperature is 50 degrees F to allow for improved adhesive performance.
       3. The membrane flashing shall be carefully positioned prior to removal of release film to avoid wrinkles and buckles.
       4. Adhere flashing membrane to the walls by removing the release film. Broom or roll all walls. All seams shall be rolled-in with a silicone roller.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Roof Edges:
       1. Roof edge flashings are applicable for gravel stop and drip edge conditions as well as for exterior edges of parapet walls.
       2. Flash roof edges with metal flanges nailed 4 inches (102 mm) O.C. to pressure-treated wood nailers. Where required, hot-air weld roof membrane to coated metal flanges.
       3. When the fascia width exceeds 4 inches (102 mm), coated metal roof edging must be attached with a continuous cleat to secure the lower fascia edge. The cleat must be secured to the building no less than 12 inches (305 mm) O.C.
       4. Alternatively, roof edges may be flashed with a 2-piece snap on fascia system, adhering the roof membrane to a metal cant and face nailing the membrane 8" on center prior to installing a snap-on fascia.
       5. Flash roof edge scuppers with a coated metal insert that is mechanically attached to the roof edge and integrated as a part of the metal edging.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Parapet and Building Walls:
       1. Flash walls with EverGuard TPO membrane adhered to the substrate with bonding adhesive, loose applied (Less than 18 inches (457 mm) in height) or with coated metal flashing nailed 4 inches (102 mm) on center to pressure-treated wood nailers.
       2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 8 inches (203 mm) on center; termination bars that are counter flashed shall be fastened 12 inches (305 mm) on center.
       3. Roof membrane must be mechanically attached along the base of walls with screws and plates (deck securement) or screws and inverted termination bar (wall securement) at the following rate:
          1. Mechanically Attached Systems: Per in-lap on center spacing, with a 12 inch (305 mm) maximum
          2. Fully / Self Adhered Systems: 12 inches (305 mm) on center
          3. Ballast Applied Systems: 8 inches (203 mm) on center
       4. All coated metal wall flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings.
       5. Metal counterflashings may be optional with fully adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with EverGuard caulking.
       6. Flash wall scuppers with a coated metal insert that is mechanically attached to the wall and integrated as part of the wall flashing.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Curbs and Ducts:
       1. Flash curbs and ducts with EverGuard TPO membrane adhered to the curb substrate with bonding adhesive, loose applied (Less than 18 inches (457 mm) in height) or with coated metal flashing nailed 4 inches (102 mm) on center to pressure-treated wood nailers.
       2. Secure membrane flashing at the top edge with a termination bar. Water Block shall be applied between the curb/duct surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened every 8 inches (2.3 mm) o.c.; termination bars that are counter flashed shall be fastened 12 inches (305 mm) on center.
       3. Roof membrane must be mechanically attached along the base of walls with screws and plates (deck securement) or screws and inverted termination bar (wall securement) at the following rate:
          1. Mechanically Attached Systems: Per in-lap on center spacing, with a 12 inches (305 mm) maximum
          2. Fully / Self Adhered Systems: 12 inches (305 mm) on center
          3. Ballast Applied Systems: 8 inches (203 mm) on center
       4. All coated metal curb flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings.
       5. Metal counterflashings may be optional with fully adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with EverGuard caulking.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Roof Drains:
       1. Roof drains shall be fitted with compression type clamping rings and strainer baskets. Original-type cast iron and aluminum drains, as well as retrofit-type cast iron, aluminum or molded plastic drains are acceptable.
       2. Roof drains shall be provided with a minimum 36 inches (914 mm) by 36 inches (914 mm) sump. Slope of tapered insulation within the sump shall not exceed 4 inches (102 mm) in 12 inches (305 mm).
       3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a 1/2 inch (13 mm) of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.
       4. For cast iron and aluminum drains, the roofing membrane shall be set in a full bed of water block on the drain flange prior to securement with the compression clamping ring. Typical water block application is one 10.5 ounce (315 g) cartridge per drain.
       5. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate roof membrane drain flashing a minimum of 12 inches (305 mm) larger than the sump area shall be installed. The roof membrane shall be mechanically attached 12 inches (305 mm) on center around the drain with screws and plates. The separate roof drain flashing shall be heat welded to the roof membrane beyond the screws and plates, extended over the drain flange, and secured as above.
       6. Tighten the drain compression ring in place.
    2. Expansion Joints
       1. The membrane shall be mechanically fastened (or fully adhered based on system) along edge of expansion joint opening with appropriate Drill-Tec fasteners and plates within 1/4" to 1/2" of the membrane edge 12" O.C
       2. When expansion joint is on curbs, the reinforced flashing must be bonded to curb face with Everguard Bonding Adhesive and membrane on top of curb face must be nailed 12" O.C. with deformed shank roofing nail with 3/8" wide head.
       3. The expansion joint cover bellows shall be at least 1.5 times the expansion joint opening.
       4. Alternately, expansion joints may be field fabricated.

\*\* NOTE TO SPECIFIER \*\* SEPARATION MAT. Delete if not required.

* 1. SEPARATION MAT
     1. Apply a 3 oz poly separation slip-sheet above the roofing membrane under all ballasted installations where existing stone ballast is reused or where the underside of the paver is smooth and regular, and has integral drainage channels.
     2. Apply a 6 oz poly cushioning slip-sheet above the roofing membrane under all paver applications where pavers are used as walkways, work surfaces, or as heavyweight perimeter ballast.
     3. Loose-lay separation mat over the membrane so that wrinkles and buckles are not formed. Overlap separation mat a minimum of 6 inches (153 mm) for side and end laps, and immediately install ballast or pavers over the loose laid separation mat.

\*\* NOTE TO SPECIFIER \*\* INTERLOCKING PAVERS. Delete if not required.

* 1. INTERLOCKING PAVERS
     1. Install interlocking concrete pavers in accordance with requirements determined by the most current revision of ASCE 7, and the paver manufacturer's recommendations for stagger and interlock.
     2. Utilize perimeter securement of interlocking pavers and/or paver clips in accordance with the paver manufacturer's requirements.

\*\* NOTE TO SPECIFIER \*\* NON-INTERLOCKING PAVERS. Delete if not required.

* 1. NON-INTERLOCKING PAVERS
     1. Install non-interlocking concrete pavers in accordance with requirements determined by the most current revision of ASCE 7 and the paver manufacturer's requirements.
     2. Utilize perimeter securement of non-interlocking pavers in accordance with the paver manufacturer's requirements.

\*\* NOTE TO SPECIFIER \*\* STONE BALLAST. Delete if not required.

* 1. STONE BALLAST
     1. Install stone ballast in accordance with requirements determined by the most current revision of ANSI RP-4.
        1. Minimum ballast application rate for #4 nominal 1-1/2 inches (38 mm) ballast is 10 lb per sf (50 kg/sm).
        2. Minimum ballast application rate for #2 nominal 2-1/2 inches (63 mm) ballast is 13 lb per sf (65 kg/sm).

\*\* NOTE TO SPECIFIER \*\* TRAFFIC PROTECTION. Delete if not required.

* 1. TRAFFIC PROTECTION
     1. Install walkway pads/rolls at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
     2. Walkway pads shall be spaced 2 inches (51 mm) apart to allow for drainage between the pads.
     3. Fully adhere walkway pads/rolls to the roof membrane with solvent-based bonding adhesive, applied at the rate of 1 gal per 100 sf (0.42 l/sm) to both the walkway and roof membrane surfaces. Press walkway in position once adhesive is tacky to the touch.
     4. Alternatively, walkway pads/rolls may be hot-air-welded to the roof membrane surface continuously around the perimeter of the pad/roll.
  2. ROOF PROTECTION
     1. Protect all partially and fully completed roofing work from other trades until completion.
     2. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas.
     3. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.
     4. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.
  3. CLEAN-UP
     1. All work areas are to be kept clean, clear and free of debris at all times.
     2. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.
     3. All tools and unused materials shall be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.
     4. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.
     5. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.
     6. Clean and restore all damaged surfaces to their original condition.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if Well Roof Advantage maintenance program is specified.

* 1. MAINTENANCE
     1. Inspections to the roof shall be performed annually by a GAF Master Select contractor.
     2. An annual roofing system maintenance program shall be performed by a Master Select contractor in accordance with GAF's 10 Point Maintenance Program provided with your Diamond Pledge guarantee.
     3. Submit copies of the roof inspection form, accompanying photographs (a minimum of 6 photos showing the condition of the roof and critical details), and a record of all roofing system maintenance to the GAF Contractor Services Department within sixty (60) days of the anniversary date of the completion of the roofing system. Annual roof inspections must be started within the first two (2) years of the guarantee term.

END OF SECTION