T. Clear Corporation
PO Box 416
Hamilton, OH 45012
Phone: (800) 544-7398
Phone: (513) 870-9246
Fax: (513) 870-9606
E-mail: technical@tclear.com
www.tclear.com

This MANU-SPEC® utilizes the Construction Specifications Institute (CSI) *Manual of Practice*, including *MasterFormat*™, *SectionFormat*™ and *PageFormat*™. A MANU-SPEC is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets [ ]; delete optional text in final copy of specification. Specifier Notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in Specifier Notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

This MANU-SPEC specifies insulation board laminated to a concrete panel as the ballast component of a Protected Membrane Roof (PMR) assembly, marketed under the LIGHTGUARD® and HEAVYGUARD® trade names, and includes roof pavers and rock ballast for PMR Systems as manufactured/marketed by T. Clear Corporation. This MANU-SPEC specifies application of cementitious insulation roof panels over single-ply roofing systems. Revise MANU-SPEC section number and title below to suit project requirements, specification practices and section content. Refer to CSI *MasterFormat* for other section numbers and titles.

SECTION 075500
ROOF & DECK INSULATION
(PROTECTED SINGLE-PLY MEMBRANE ROOFING SYSTEM)

PART 1 GENERAL

1.01 SUMMARY

Specifier Note: Modify this Specification only as required to qualify for the manufacturer's warranty specified herein.

A. Section Includes: Protected single-ply membrane roofing system, including insulation board laminated to a concrete panel as ballast component.

Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI *MasterFormat* and specifier's practice.

B. Related Sections: Section(s) related to this section include:

1. Roofing: Division 7 Roofing Sections.

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain References Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract of Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard. It is a listing of all references used in this section.

1.02 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

Specifier Note: Retain, edit or delete paragraph below to suit project requirements.

B. ASTM International:

1. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
4. ASTM D448 Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
5. ASTM D1621 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
6. ASTM D2103 Standard Specification for Polyethylene Film and Sheeting.

7. ASTM D4637 Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane.
8. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

1.03 SYSTEM DESCRIPTION

A. Performance Criteria: Physical Qualities of Extruded Polystyrene Insulation: Extruded polystyrene insulation shall comply with ASTM C578 and exhibit the following qualities of physical resistance:
   1. Thermal Resistance (aged R-value) (ASTM C518): 5 per inch at 75 degrees F (24 degrees C).
   2. Compressive Strength (ASTM D1621): [40 psi (276 kPa)] [25 psi (172 kPa)], minimum.
   3. Water Absorption (ASTM C272): 0.1% average.
   4. Water Vapor Permeance (ASTM E96): 0.6 perm - inch [34 ng/(Pa × s × m^2)] average.

B. Approvals: Provide protected membrane roofing system with the following approvals:
   1. UL Loose-Laid Single-Ply Membrane Systems and BUR Modified Bitumen Membrane Systems TGIK R14358(N).
   2. Factory Mutual Engineering, Inc., Factory Mutual Standard M4470.
   3. Underwriters Laboratories, Inc., Roofing Materials and Systems Directory.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories and finishes of system to be installed.

D. Samples: Submit selection and verification samples for finishes, colors and textures.

E. Quality Assurance Submittals: Submit the following:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
   3. Manufacturer's Instructions: Manufacturer's installation instructions. Include manufacturer's specifications, standard detail and installation instructions for specified materials.
      a. Field Reports: Submit reports of field inspections by the manufacturer's authorized representative.
   4. Marked Drawings: Submit 1 set of marked record drawings showing "as-built" conditions.

Specifier Note: Coordinate paragraph below with Part 3 Field Quality Requirements Article herein. Retain or delete as applicable.

   5. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

F. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.
      a. Insulation, roofing and related flashing and sheetmetal work shall be performed by a single applicator who is authorized, or otherwise accepted in writing, by primary roofing materials manufacturer and cementitious surfaced extruded polystyrene insulation manufacturer for installation of a fully warranted roof in accordance with specified roof warranty requirements.
   2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Conditions of the Contract and Division 1 Regulatory Requirements Section. Repetitive statements should be avoided. Installation must comply with the requirements of applicable local,

state and national code jurisdictions.

B. Regulatory Requirements: [Specify applicable requirements of regulatory agencies.].

Specifier Note: Fire Rating: Variety of fire resistance rated assemblies can be constructed using LIGHTGUARD panels, ranging from 1 - 2 hour assembly ratings. Consult UL Directory or manufacturer for specific construction requirements. Status of approvals by code bodies and other agencies can be obtained from T. Clear Corporation.

1. Fire Retardancy: The roof deck, roof insulation and roof membrane assembly shall comply with requirements for a Class [A] or [B] roof.
2. Wind Resistance: The minimum basic wind speed for determining design wind pressure shall be 90 mph (145 kph), exposure.

C. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1. Pre-Roofing Conference: Prior to commencement of work, conduct a meeting at project site to review contract requirements and procedures. Do not commence work prior to pre-roofing conference unless authorized by Owner.

1.06 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Afford materials the degree of preservation, packaging and packing necessary to prevent deterioration and/or damage that might result from the hazards to which they will be subjected during shipment, handling and storage.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store materials in a dry, weatherproof, well-ventilated place. Do not store or stack material on roof decks in concentrations in excess of design live loadings. Do not leave unprotected materials on the roof overnight. Protect insulation from exposure to sunlight and fire ignition. Remove and replace damaged materials as directed or as necessary.

1.07 PROJECT CONDITIONS

A. Environmental Requirements/Conditions: Substrate and ambient air temperature shall be in accordance with manufacturer's requirements. Do not commence application of roofing materials until existing and forecasted weather conditions will permit performance of work in accordance with manufacturer's recommendations and established procedures. Do not apply roofing materials or flashing components during conditions of rain or mist. Proceed only when manufacturer and applicator are willing to guarantee the work as described herein without reservations or restrictions.

Specifier Note: Coordinate article below with Conditions of the Contract and with Division 1 Closeout Submittals (Warranty) Section.

1.08 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

Specifier Note: Coordinate paragraph below with manufacturer's warranty requirements. T. Clear Corporation offers the following: Clear Corporation offers single-source, total performance warranties, limited warranties and extended warranties. Standard 10 year warranty covers product integrity and insulation value. Also covered are concrete delamination and wind disturbance up to 90 mph (145 kph). The company offers 5 year and 10 year extensions and wind speeds up to 120 mph (193 kph).

1. Warranty Period: [Specify term.] years commencing on Date of Substantial Completion.
2. Warranty: Before final payment, furnish to Owner a written warranty by a single manufacturer warranting new roofing, flashings and other components of roofing system to be watertight for a period of 10 years from date of final acceptance, agreeing to make repairs necessary to ensure a watertight roof during entire 10 year guarantee period, and agreeing to repair or replace roofing components damaged by winds with gust speeds of [Specify.] mph (kph) velocity or less. Also, that cementitious surfaced insulation and any extruded polystyrene foam under that product will retain at least 80% of its thermal resistance and that concrete topping on extruded polystyrene foam will remain attached to foam.

Specifier Note: Coordinate article below with Division 1 Closeout Submittals (Maintenance Materials) Section. Maintenance: Proper roof maintenance includes periodic inspection of LIGHTGUARD panels, flashing and parapets, sealants, building joints, drains and other components which can have a direct impact on roof performance and longevity. Broken concrete panels should be repaired as soon as possible to protect the polystyrene foam from sunlight (UV) degradation. Vegetation growth should be controlled.

1.09 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

Specifier Note: Revise paragraph below specifying size and percentage as required for project.

1. Quantity: Furnish quantity of [Identify items.] units equal to [Specify %.] of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" or "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

2.01 CEMENTITIOUS BOARD INSULATION

A. Manufacturer: T. Clear Corporation.

Specifier Note: Paragraph below is an addition to CSI *SectionFormat* and a supplement to MANU-SPEC. Retain or delete paragraph below per project requirements and specifier's practice.

1. Contact: PO Box 416, Hamilton, OH 45012; Telephone: (800) 544-7398, (513) 870-9246; Fax: (513) 870-9606; E-mail: technical@tclear.com; Web site: www.tclear.com.

Specifier Note: LIGHTGUARD provides insulation as well as ballast. It is used as the ballast component of a Protected Membrane Roof (PMR) assembly and is suited for new or reroofing use on commercial and industrial buildings. LIGHTGUARD consists of a concrete panel laminated to insulation board. The panels can be installed on top of most types and brands of roof membranes, offering protection from thermal shock, weathering forces and maintenance related foot traffic. LIGHTGUARD and HEAVYGUARD, as part of a PMR, are effective in controlling condensation and dew point location in industrial plants such as paper mills. By insulating the roof assembly and keeping the dew point above roof membrane, LIGHTGUARD protects valuable machinery in pulp and paper mills, textile mills and other installations where moisture can cause damage to equipment. LIGHTGUARD is reusable in reroofing and vertical expansion situations. It is free of chlorofluorocarbons (CFCs). HEAVYGUARD is a heavier version of the LIGHTGUARD panel. It is used where high traffic and higher point loading require a thicker concrete-panel component.

B. Proprietary Product(s): LIGHTGUARD and HEAVYGUARD Cementitious Board Insulation:

1. LIGHTGUARD Panels: 3/8 inch (9.5 mm) latex modified concrete panel is laminated to Styrofoam closed-cell extruded polystyrene insulation board, ASTM C578, Type VI, 2 inches or 3 inches.
2. HEAVYGUARD Panels: Fabricated with a 15/16 inch (24 mm) thick concrete face.
3. Sizes: Provide LIGHTGUARD panels 2 feet × 4 feet (610 × 1219 mm) by [2 3/8 inches (60 mm)] or [3 3/8 inches (86 mm)] thick; HEAVYGUARD panels [2 15/16 inches (75 mm)] or [3 15/16 inches (100 mm)].
4. Weight: Provide LIGHTGUARD weighing 4.5 psf (22 kg/m^2); HEAVYGUARD weighing 11 psf (54 kg/m^2).
5. Colors: [Specify color. LIGHTGUARD panels are available in 5 colors: natural gray, red, green, COOLGUARD and tan.].
6. Shapes: Provide flat and rectangular, with tongue-and-groove edges allowing for interlocking construction.
7. Product(s) Testing: Provide insulation board with the following properties:
   a. R-value: 5 ft^2 × h × °F/Btu per inch (0.88 m^2 × K/W per 25.4 mm) of foam.
   b. Thermal Conductivity (k-value): 0.2 Btu/(ft^2 × h × °F) (0.35 W/(m × K)).
   c. Compressive Strength of Insulation: 40 psi (195 kg/m^2).

Specifier Note: T. Clear Corporation warranted, gravel ballasted, Protected Membrane Roofs require ASTM D448, #4 or larger gravel. The gravel must be well-washed and installed over a T. Clear Corporation approved fabric (found in Technical Data Sheet). Crushed stone is preferred in PMR systems, but rounded gravel is acceptable. Refer to Technical Data Sheet 4.4 for specific details on weight per square foot and gravel size.

C. Product(s): Rock Ballast for T. Clear Corporation PMR systems.

1. Rock Ballast: [Specify rock ballast weight per square foot.].

Specifier Note: T. Clear Corporation warranted, paver ballasted, Protected Membrane Roofs require minimum 3000 psi (21 MPa) pavers. The pavers must be made from standard aggregate and shall weigh a minimum of 22 psf (107 kg/m^2). Applicable sizes are 12 inches × 12 inches, 8 inches × 16 inches, 18 inches × 18 inches and 24 inches × 24 inches (305 × 305, 203 × 406, 457 × 457 and 610 × 610 mm). Applicable design details can be found in Technical Data Sheet 4.4. Hydro-prest pavers are preferred in PMR systems. Refer to Technical Data Sheet 4.4 for specific details. Consult T. Clear Technical Services for specific installation requirements.

D. Product(s): Pavers for T. Clear Corporation PMR systems.

1. Pavers: Minimum 3000 psi (21 MPa) pavers made from standard aggregate and weighing a minimum of 22 psf (107 kg/m^2).
2. Sizes: [Specify 12 inches × 12 inches, 8 inches × 16 inches, 18 inches × 18 inches and 24 inches × 24 inches (305 × 305, 203 × 406, 457 × 457 and 610 × 610 mm).].

Specifier Note: Edit article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.03 PROTECTED MEMBRANE ROOFING SYSTEM MATERIALS

A. Roofing System: Obtain primary roofing products from a single manufacturer. Obtain secondary products from sources recommended and approved by the manufacturer of primary roofing products for use with the specified roofing system.

1. Air Infiltration Seal: [ ] mil polyethylene sheet conforming to requirements of ASTM D2103 and having a tested vapor transmission rating of 0.2 perms (11 ng/(Pa × s × m^2)).
2. Single-Ply Elastic Sheet Roofing System (EPDM):
    a. Roofing Membrane: 45 mil (1.1 mm) EPDM sheet conforming to requirements of ASTM D4637, Type 1, Grade 1, Class V [Firestone Building Products Company “Rubbergard”], [Goodyear Tire and Rubber Company “Versigard”], [Carlisle Tire and Rubber Company “Sure-Seal”], [Genflex] or approved.
    b. Membrane Flashing: Uncured EPDM.
    c. Adhesive and Sealants: As recommended and supplied by the roofing membrane manufacturer for the specified conditions of use.
    d. Tape: As recommended by membrane manufacturer.
    e. Other: Furnish fasteners, seals, covers, strips, rings, plates and other roofing system components required for a complete roofing installation.
    f. Molded Pipe Flashing: Preformed EPDM sleeves, by membrane manufacturer, or approved.
3. Single-Ply Elastic Sheet Roofing System (Thermoplastic):
    a. Roofing Membrane: Select membrane from list approved by cementitious surfaced insulation manufacturer.
    b. Membrane Flashing: Approved flashing from thermoplastic membrane manufacturers.
    c. Other: Furnish fasteners, seals, covers, strips, rings, plates and other roofing system components required for a complete roofing installation.
4. Extruded Polystyrene Insulation: Rigid, closed-cell, extruded polystyrene board conforming to requirements of ASTM C578, Type VI, 2 feet × 4 feet (610 × 1219 mm) in size, [2 inches (51 mm)] or [3 inches (76 mm)] thick, with tongue-and-groove sides, and [3/8 inch (9.5 mm)] thick cementitious top surface, [LIGHTGUARD (LG Board)], [15/16 inch (23.8 mm)] thick cementitious top surface, [HEAVYGUARD (HG)] by T. Clear Corporation.

B. Expansion Joint Filler: Preformed nonextruding expansion joint filler, 1/4 inch (6.4 mm) thick, Sonneborn “Sonoflex F,” W. Meadows “Ceramar,” Dow “Ethafoam” or approved.

C. Metal Perimeter Securement and Metal Strapping.

1. Perimeter Securement: Hickman “Edge-Guard” termination fascia and perimeter hold-down system, Metal Era, “Anchor-Tite PMR/Lock Version Fascia System” or other system approved by the manufacturer of cementitious surfaced extruded polystyrene.
2. Metal Straps: Not less than 22 gauge [Galvalume] [Zincalume] [Stainless] [Kynar coated] steel sheet straps or others as approved by the manufacturer of cementitious surfaced extruded polystyrene insulation.
3. Fasteners:
    a. For fastening metal perimeter securement to the perimeter of the roof structure, use the appropriate fastener for the substrate following the installation recommendations of the fastener manufacturer.
    b. For securing metal straps to cementitious surfaced extruded polystyrene insulation board [“Fabco Fab-Lok 10-12”], [Olympic Fastening Systems, Inc., “Bulb Tite”] blind rivet RV6604-8-10, [SFS Stadler TPR or TPR2 for HG “Peel Rivet”] or other fasteners approved by the cementitious surfaced extruded polystyrene insulation manufacturer.
    c. Other: Furnish fasteners required for a complete installation in required quantities and varieties.

2.04 RELATED MATERIALS

A. Related Materials: Refer to other sections listed in Related Sections paragraph herein for related materials.

2.05 SOURCE QUALITY

A. Source Quality: Obtain cementitious insulation panel products from a single manufacturer.

PART 3 EXECUTION

Specifier Note: Article below is an addition to the CSI *SectionFormat* and a supplement to MANU-SPEC. Revise article below to suit project requirements and specifier's practice.

3.01 MANUFACTURER'S INSTRUCTIONS

Specifier Note: Roofs must be designed and constructed to drain water within 48 hours after rainfall. A 1/4 inch per foot (6.4 mm/m) slope is recommended. Prevention of air infiltration into the area beneath a modified bitumen membrane is critical to its wind stability. Where a fire resistant underlayment material such as gypsum board is used as a 15 minute fire barrier, it must be mechanically attached to the deck in accordance with the applicable Factory Mutual criteria.

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.03 PREPARATION

Specifier Note: Delete paragraph below if no demolition of existing roofing required.

A. Demolition of Existing Roofing Materials:
   1. Materials to be Demolished: Remove existing roofing in areas indicated on the Drawings.
   2. Title to Materials and Disposition: Title to demolished material is vested in the Contractor; promptly remove from the Owner's property. Comply with federal, state and local laws and regulations in disposing of demolished materials.
   3. Protection of Building from Weather: Protect interior of building, materials and equipment from weather at all times. Provide temporary coverings where required and attend to them as necessary to ensure their effectiveness.
   4. Protection of Existing Building Elements to Remain: Protect existing building elements that are not to be demolished from damage and destruction. Repair any such damage at no additional cost to the Owner. Promptly repair any damage caused by demolition operations at no cost to the Owner.
   5. Cleanup: Control dust resulting from demolition and removal work to avoid creation of a nuisance in the surrounding area. Do not use water to control dust where it will result in hazardous or objectionable conditions such as ice, flooding and pollution. Remove debris and rubbish in such a manner that spillage on streets and in the adjacent area will be prevented.
   6. Temporary Roofing: Temporary roofing may be installed when adverse weather conditions delay installation of the specified roofing assembly and when it is determined by the Contractor that job progress or the protection of other work necessitates such procedure. Decisions relative to the installation of temporary roofing are the Contractor's sole responsibility. The Contractor will not be compensated for costs associated with temporary roofing and will not be awarded an extension of construction time because of delays resulting from his decision. Remove temporary roofing materials prior to installation of permanent roofing.
B. Cooperation with Testing Agencies: Cooperate with inspection and testing agencies engaged or required to perform services in connection with the roofing system installation.
C. Surface Preparation: Remove foreign material that would interfere with the roofing application. Repair, without additional cost to the Owner, any irregularities in the roofing substrate.

Specifier Note: Coordinate article below with manufacturer's recommended installation details and requirements. Installation requirements vary according to roof deck and roofing membrane type. Complete installation recommendations are available from the manufacturer. Refer to manufacturer's technical installation sheet for specific membrane/deck combinations under consideration.

3.04 INSTALLATION

A. Protected Membrane Roofing Installation:
   1. General: Install the protected membrane roofing system, including the roofing membrane, membrane flashings and accessories, insulation, perimeter securement, metal strappings and sheetmetal flashings, in strict accordance with manufacturer's printed instructions as required to obtain the specified guarantee.
   2. Installing Air Infiltration Seal (For Loose-Laid Single-Ply Membranes): Install air infiltration seal in largest practical size sheets, loose-laid. Overlap edge and end joints 6 inches (152 mm) and seal with tape or mastic. Before proceeding with installation of roof insulation, carefully examine the air infiltration seal surface; patch any areas that have been damaged. See T. Clear Corporation Guide to Achieve the Secured Single Ply (Tech. Data Sheet No. 20).
   3. Installing Insulation (Below Roof Membrane) Over Air Infiltration Seal:
      a. Slope: Conform to slopes and dimensions shown on the Drawings.
      b. Fitting: Butt insulation boards tightly with no gaps greater than 1/4 inch (6.4 mm).
      c. Attachment: Size fasteners to penetrate the full depth of insulation and into decks. Space fasteners as required

to comply with specified wind resistance criteria. Minimum FM 1-60.

d. Protection of Applied Insulation: Install only as much insulation as can be covered by the complete membrane system in 1 day. Protect open ends of each day's work with temporary water cutoffs and remove when work is resumed. Do not permit storing, walking, wheeling or trucking directly on insulation or on roofed surfaces; provide smooth, clean board or plank walkways, runways and platforms.

4. Applying Single-Ply Elastic Sheet Roofing Materials: Apply single-ply membrane roofing and flashing in accordance with manufacturer's printed instructions. Apply only to properly prepared surfaces. Extend over edges and down wall faces in 1 continuous piece.

B. Installing Cementitious Surfaced Extruded Polystyrene Insulation (Over Roof Membrane): Install surfaced insulation board in strict accordance with manufacturer's current printed instructions. Make long joints (length of board) continuous. Stagger side joints. Fit boards carefully to avoid cracks or openings. Sides of boards shall be tightly butted to adjacent board. Extend boards to within 1/4 inch - 1/2 inch (6.4 - 12.7 mm) of projections. Comply with T. Clear Technical Data Sheet #20.

C. Installing Perimeter Securement and Metal Strapping (Securement):

1. General: Install perimeter securement and [Interior metal straps] in strict accordance with cementitious surfaced insulation manufacturer's printed instructions for the particular conditions of installation. If conditions are encountered where no such written instructions clearly apply, obtain direction from the manufacturer before proceeding.

2. Installing Sheet Metal Perimeter Securement: Install perimeter securement continuously around roof penetrations in sections not exceeding 12 feet (4 m) in length. Allow for expansion and contraction. Attach edge securement using corrosion resistant screws spaced not more than 12 inches (305 mm) on center. Attach edge securement to the first perimeter insulation board that has tongue-and-groove integrity and is not less than 1 foot (304.8 mm) in width. Extend perimeter securement not less than 6 inches (152 mm) onto the surfaced insulation board and attach with specified fasteners spaced not more than 18 inches (457 mm) on centers.

3. Installing Concrete Paver Perimeter Securement:

a. Adhered Membranes: For roofs in 90 mph (145 kph) wind range only, securement shall be a single row of nominal 2 inch × 8 inch × 16 inch (51 × 203 × 406 mm) pavers laid with their long edge perpendicular to the roof perimeter.

b. Loose-Laid Membranes and Multiple Layer Foam Installations: For roofs in 90 mph (145 kph) wind range only, securement shall be a single row of nominal 2 inch × 2 foot × 2 foot (51 × 610 × 610 mm) or two rows of nominal 2 inch × 8 inch × 16 inch (51 × 203 × 406 mm) pavers laid with their long edge perpendicular to the roof perimeter.

c. Paver Placement:

1) The height of gravel stop or parapet shall extend above the paver in all cases.

2) Pavers shall be placed in continuous rows butted together at all perimeters and openings or penetrations greater than 4 feet (1219 mm) long.

3) When the 4 foot (1219 mm) long direction of the board runs parallel to the perimeter, pavers shall be placed with their outside edge centered on the perimeter board (covering the first board joint). When the 2 foot (610 mm) long direction of the board runs parallel to the perimeter, pavers shall be placed in from the perimeter at least 12 inches (305 mm).

4. Locating Interior Metal Straps (Required for Range 2 Securement):

a. Place straps running in the long direction of the insulation boards on the second and third row of whole boards in from the perimeter.

b. Place straps running in the short direction of the insulation boards starting at 3 feet (914 mm) from the perimeter and running every 10 feet (3 m) thereafter along the entire roof to attach the interior straps running in the long direction of the board to the metal perimeter securement. Only the first strap at the perimeter, running in the short direction of the boards, needs to go across the entire roof. The other straps proceed only as far as the innermost straps running in the long direction.

5. Locating Corner Straps (Required for Range 2 Securement): Place corner cross braces at each corner.

a. Fastening Straps to Cementitious Surfaced Extruded Polystyrene Insulation Board: Use tools recommended by the manufacturer to ensure proper fastener installation. Place fasteners in predrilled holes in the insulation board. Drive fasteners perpendicular to the appropriate plane; do not overdrive. Locate fasteners not more than 18 inches (457 mm) on centers and not less than 3 inches (76 mm) from any of the insulation board edges.

D. Site Tolerances: [Specify applicable site tolerances for specified product(s) installation.].

E. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related materials installation.

Specifier Note: Coordinate article below with Division 1 Quality Assurance and Quality Control Sections.

3.05 FIELD QUALITY REQUIREMENTS

A. Inspection: An authorized representative of the manufacturer who is to furnish the single source roof warranty shall inspect roofing work in progress and at final completion prior to issuance of roofing warranty.

Specifier Note: Edit paragraph below. Establish number and duration of periodic site visits with Owner and manufacturer, and specify below. Consult with manufacturer for services required. Coordinate paragraph below with Division 1 Quality Assurance Section and Part 1 Quality Assurance Submittals herein. Delete if manufacturer's field service is not required.

B. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: [Specify number and duration of periodic site visits.].

3.06 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

1. At the end of the construction period, remove debris and excess materials from the Owner's property. Inspect the roofing system. Repair or replace deteriorated, damaged or defective work.

3.07 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION