



FOAMULAR[®], Thermal, Tapered Roof Insulation

Guide Specifications

PROJECT ENGINEER RESPONSIBILITY: This is a general specification guide, intended to be used by experienced construction professionals, in conjunction with good construction practice and professional judgment. This guide is to aid in the creation of a complete building specification that is to be fully reviewed and edited by the engineer. Sections of this guide should be included, edited, or omitted based on the requirements of a specific project. It is the responsibility of both the specifier and the purchaser to determine if a product or system is suitable for its intended use. Neither Owens Corning, nor any of its subsidiary or affiliated companies, assume any responsibility for the content of this specification guide relative to actual projects and specifically disclaim any and all liability for any errors or omissions in design, detail, structural capability, attachment details, shop drawings or other construction related details, whether based upon the information provided by Owens Corning or otherwise.

SECTION 07 22 16

ROOF BOARD INSULATION

Note to Specifier: Tapered THERMAPINK[®] or FOAMULAR[®] are for below membrane roof insulation systems, including mechanically attached, fully adhered, or ballasted single ply or modified bitumen or BUR.

Note to Specifier: Only THERMAPINK[®] insulation is intended for use directly over steel roof decks with no thermal barrier, constructed in accordance with UL Roof Deck Construction #457. FOAMULAR[®] or THERMAPINK[®] insulation may be used over steel deck WITH thermal barrier when needed for FM Class I, or when the limits of UL construction #457 are exceeded. Tapered systems that, by design, vary in maximum thickness, and often have greater maximum thicknesses, should be verified for compliance with UL construction #457.

Note to Specifier: Consult local building code for applicable requirements regarding the need for a thermal barrier (UL 1256/FM 4450), rooftop exterior surface spread of flame or fire penetration (ASTM E108), structural fire resistance (ASTM E119), wind uplift resistance, or other applicable requirements.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide tapered [THERMAPINK[®] 18, 25, FOAMULAR[®] 400, 600] extruded polystyrene roof board insulation.

1.2 SUBMITTALS

- A. Product Data: Submit data on product characteristics, performance criteria, and limitations, including installation instructions.
- B. Sustainable Design: Submit manufacturer's sustainable design certifications as specified.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: The installation work of this Section shall be performed by an experienced roofing contractor approved and certified by the roofing system manufacturer.
- B. Each insulation board must be labeled with manufacturer's name, product brand name, ASTM material specification reference, and identification of the third party inspection agency used for building code qualification.



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- C. Each tapered panel shall be labeled with a code letter to identify its slope and to identify its proper position on the roof. Each panel shall also be marked with an arrow to identify direction of slope.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original packaging.
- B. Store and protect products in accordance with manufacturer's instructions. Store in a dry area and protect from water, direct sunlight, flame, and ignition sources. Do not install insulation that has been damaged or wet.
 - 1. In the event the board insulation becomes wet, wipe dry prior to installation.

Note to Specifier: For proper fire protection of plastic foam in storage, consult the National Fire Protection Association (NFPA) standards or the authority having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Roof deck shall be free of ponded water, ice or snow. This precaution is to discourage potential future condensation on the underside of the membrane.
- B. Do not expose Tapered [THERMAPINK[®], FOAMULAR[®]] insulation to surfaces such as vent stacks, pipes or other rooftop appurtenances whose constant temperature is in excess of 165°F. If temperature cycling conditions are anticipated near the maximum recommended use temperature, consult an Owens Corning representative for recommendations regarding system components.
- C. When insulation is to be exposed to sunlight for prolonged periods due to job site delays, protect the insulation with a light colored opaque covering. Provisions should be made to prevent wind loss of insulation materials at the job site when partially open units of Tapered [THERMAPINK[®], FOAMULAR[®]] are on hand.
- D. Dark membrane ballasted systems must have ballast installed immediately after installation of membrane. This precaution is required to prevent potential damage to the insulation from excessive heat due to prolonged exposure to sunlight.
- E. Roofs exposed to chemical discharge, or to reflective vertical surfaces adjacent to the roof, require special consideration. Consult this specification for recommendations regarding system components.
- F. [Any deteriorated decking shall be repaired or replaced. Existing roof drains must be verified to be open and adequate to promote proper roof drainage.]

1.6 WARRANTY

- A. A thermal performance warranty shall be issued to the Owner upon completion of the work. Insulation shall be warranted to retain all physical properties and a minimum of 90% of its published R-value for the lifetime of the product.
 - 1. [A single source full roof covering system warranty shall be issued to the Owner upon completion of the work.]

Note to Specifier: Consult an Owens Corning representative for information on obtaining warranties. Single source full system warranties are available for certain roofing systems.



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PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Owens Corning Insulating Systems, LLC, Toledo, OH 43659; www.owenscorning.com.

2.2 MATERIALS

- A. Extruded Polystyrene (XPS) Insulation:
1. Physical Properties:
 - a. Tapered Materials: Tapered [THERMAPINK[®], FOAMULAR[®]] closed-cell foam panels with continuous as-extruded skin on the face and back surfaces, conforming to the minimum physical requirements of ASTM C-578, Type IV.
 - b. Fill Materials: [THERMAPINK[®] 18, 25, 40] [FOAMULAR[®] 250, 400, 600] closed-cell foam panels with continuous as-extruded skin on the face and back surfaces, conforming to the minimum physical requirements of ASTM C-578, [Type X, IV, VI, VII].

Note to Specifier: See the Product Data Sheets for THERMAPINK[®] or FOAMULAR[®] product physical properties and association with ASTM C578 type designations. No further specification of physical properties is required if a standard ASTM C578 type designation is given. However, if the specifier chooses to elaborate, it should be verified that the specified properties align with the chosen ASTM type category.

2. Product Criteria:
 - a. ASTM C578 type [X, IV, VI, VII], certified by independent third party such as RADCO.
 - b. Blowing Agent Formulation: Zero ozone depleting.
 - c. Compressive Strength (ASTM D 1621): [15, 25, 40,60] psi, minimum.
 - d. Edge Condition: Square edge.
 - e. Thermal Resistance (180 day real-time aging as mandated by ASTM C 578, measured per ASTM C 518 at mean temperature of 75F): [R-5.0, 5.6] per inch of thickness, with 90% lifetime limited warranty on thermal resistance.
 - f. Water Absorption (ASTM C272): Maximum [0.10] percent by volume.
 - g. Surface Burning Characteristics (ASTM E 84): Flame spread less than 25, smoke developed less than 450, certified by independent third party such as Underwriters Laboratories (UL).
 - h. Indoor Air Quality: Compliance certified by independent third party such as GreenGuard Indoor Air Quality Certified[®] and/or GreenGuard Children and Schools CertifiedSM.
 - i. Recycle Content: Minimum 20%, certified by independent third party such as Scientific Certification Systems.
 - j. Warranty: Limited lifetime warranty covering all ASTM C578 physical properties.
3. Manufacturers: Subject to compliance with product criteria, the manufacturers whose products may be incorporated into the work include but are not limited to:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv Corporation.
4. Panel Size, Tapered: Provide [slope/foot] by 4 ft. wide by 8 ft. long.
5. Panel Size, Fill Material: Provide [1/2", 3/4", 1"] thick by 4 ft. wide by 8 ft. long.

Note to Specifier: Include the following, if required for mechanically attached systems:

- B. [Insulation Fasteners and Stress Plates]: Furnished by membrane manufacturer. FM approved. Fastener head shall be designed to inhibit damage to the membrane. Minimum 3" diameter or square insulation stress plates shall provide for countersunk fastener heads.



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Note to Specifier: Thermal Barriers are not needed over concrete or wood decks. Thermal Barriers are needed only when THERMAPINK[®] or FOAMULAR[®] insulation is specified over steel deck, the limits of #457 are exceeded, or FM Class I steel deck assembly is needed. Thermal Barrier must be as specified in the building code or classified by assembly testing in accordance with UL 1256 or FM 4450 and shall be placed as prescribed in the assembly listing over steel decks. See www.ul.com "Certifications", or FM Approvals "RoofNav" for alternative thermal barrier materials and complete assembly details.

- C. [Thermal Barrier Material]: Provide one of the following:
 - 1. Gypsum Board: 1/2" (minimum thickness)
 - 2. Rigid Perlite Board: 1/2" (minimum thickness).

- D. [Overlayment]: For dark mechanically attached, or any color fully adhered, or chemically incompatible membranes, provide the following:
 - 1. [Glass mat faced gypsum roof board.]
 - 2. [Flexible glass fiber, nonwoven, non-flammable, corrosion and mildew resistant or other suitable separator (overlayment) sheets shall be used under PVC membranes and other such membranes which contain plasticizing agents. Separator sheet shall have been evaluated and approved by the membrane manufacturer for adequacy as a separator.]

- E. Membrane Fastening or Adhesion System: Per membrane manufacturer's specifications.

- F. [Ballast]: For loose laid, ballasted system, provide the following:

Note to Specifier: Building height, parapet height, and project wind zone are major factors when specifying a minimum ballast requirement. Design ballasted systems in accordance with ANSI/RMA/SPRI RP-4, Wind Design Guide for Ballasted Single-Ply Roofing Systems.

- 1. [Rounded Water Worn Gravel or Crushed Stone Ballast: ASTM D448, size [#3, #24, #2, #1].]
- 2. [Concrete Pavers: Provide a compressive strength equal to [__psi] or greater, maximum water absorption rate of [__% by volume], and dimensions, not exceeding 2" x 2' x 2']. Paver weight must be manageable for removal and replacement purposes. Concrete quality must be suitable for weathering conditions to which it will be subjected.
 - a. Paver Weight: Conform to requirements of ANSI/RMA/SPRI RP-4, Wind Design Guide for Ballasted Single-Ply Roofing Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this section will be installed. Verify that adjacent materials are dry and ready to receive insulation.
 - 1. Verify that the roof deck drains completely free of water within 48 hours following rainfall.
 - 2. Verify that the dead load carrying capability of the deck is sufficient to support code mandated live loads and dead loads incident on the roof, including the entire roof covering/insulation system.
 - 3. Verify that the roof deck provides adequate support for the insulation.

- B. Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 ROOF DECK PREPARATION

- A. [Any deteriorated roof decking shall be repaired or replaced.]



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- B. A thorough inspection should be required in the case of total tear off.
- C. [Steel Roof Decking]: Install a thermal barrier between Tapered [THERMAPINK[®], FOAMULAR[®]]/fill layers and the steel deck in accordance with construction drawings.
 - 1. Tapered/fill Thermapink layers may be installed directly over steel roof deck in accordance with the details of UL Roof Deck Construction #457.
 - 2. Tapered/fill FOAMULAR[®] layers in a steel deck application must be underlaid with a thermal barrier as specified by the building code, or, classified by assembly in accordance with UL 1256 or FM 4450. Thermal barriers may be loose-laid or secured to the deck by mechanical fastening depending on design or code requirements.
- D. [Structural Concrete (precast, poured-in-place, gypsum, or lightweight insulating)]: The surface must be clean, smooth, free of fins, sharp edges, loose and foreign materials, oil, grease, and fresh roofing cement. Repair any deck joints or cracks, any deck to wall junctions, and any other deck to penetration gaps, which are greater than 1/4".
- E. [Composite (Tectum, etc.)]: Install deck and secure in accordance with deck manufacturer's recommendations. The deck must be properly secured with all mechanical fasteners flush with the surface of the deck. The deck must be of sufficient thickness and character to develop adequate fastener holding power. Verify requirements with the membrane manufacturer.
- F. [Wood (Plank, Plywood, OSB, etc.)]: Install deck and secure in accordance with construction drawings. The deck must be well secured with all mechanical fasteners flush with the surface of the deck. The deck must be of sufficient thickness to develop adequate fastener holding power. Verify requirements with the membrane manufacturer.

3.3 VAPOR RETARDER

- A. Install a vapor retarder in accordance with construction drawings. Place the vapor retarder to insure adequate end and side joint laps. When high relative humidities inside the building or other normal climatic conditions create a condensation point within the insulation board, it may be necessary to install a vapor retarder beneath the insulation or thermal barrier. Although tapered/fill layers of THERMAPINK[®] and FOAMULAR[®] insulation have vapor retarding qualities, the need for more effective vapor retarding layers must be assessed based on the conditions present on each project. Tapered and fill layers of THERMAPINK[®] and FOAMULAR[®] insulation are compatible with most commonly used asphaltic and sheet film vapor retarding materials. See the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals for specific design guidelines.

3.4 INSULATION

- A. Install tapered roof insulation in accordance with the manufacturer's approved shop drawings.
- B. Total roof insulation aged thermal resistance shall be [R___], achieved in the thicknesses and number of layers as shown in the construction documents. R-value chosen is to be specified based on the intended use of each project and design criteria of each project, and applicable energy conservation codes. Contact an Owens Corning representative for information regarding ASHRAE 90.1 Energy Code minimum requirements for roof insulation if needed.
- C. Install thicknesses of fill in accordance with shop drawings prepared by [Owens Corning, architect, consultant] and approved by the roofing contractor. Install Tapered [THERMAPINK[®], FOAMULAR[®]] over the required base layers, following the directional arrow printed on each panel which indicates direction of slope. Note that Tapered [THERMAPINK[®], FOAMULAR[®]] panels also have a letter code printed on their surface which corresponds with panel layout shown on the approved shop drawings.



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- D. Insulation joints shall not exceed 1/4" in width. Joints wider than 1/4" shall be filled with the same insulation.
- E. Insulation shall be field trimmed to fit tightly around roof protrusions and terminations.
- F. Apply only as much Tapered [THERMAPINK[®], FOAMULAR[®]] and fill roof insulation as can be covered by the roofing membrane on the same day. Apply roof insulation in parallel rows with end joints staggered. Install side and end joints closely but do not force together. In a two layer application, apply second layer panels parallel to the first layer but with side and end joints staggered in relation to the first layer.
- G. Place the [THERMAPINK[®], FOAMULAR[®]] board with the printed logo surface down so that the black lettering is not exposed to potential solar heat gain.
- H. [For ballasted roofing systems (including PRMA*) with no cover board over the XPS,] black/dark (non-white) roofing membranes (or filtration fabrics in PRMA) over THERMAPINK[®] and FOAMULAR[®] insulation shall be ballasted immediately after placement to prevent potential heat damage from sun exposure and wind displacement of the insulation under the membrane/fabric.
- I. [For mechanically attached and fully adhered roofing systems,] in areas where black/dark membranes are used and where "reflected solar energy" is expected to be present, THERMAPINK[®] and FOAMULAR[®] insulation need protection in addition to normally specified cover boards. For example, roof areas adjacent to higher walls, particularly walls with reflective surfaces, or near large rooftop HVAC units, or near or in between clusters of mechanical equipment, or near other structures with reflective cladding (metal or glass); or near higher reflective parapets, all such areas should be considered for additional heat protection. Such roof areas must be covered with pavers or ballast. Black/dark (non-white) membranes must be coated with white reflective topping, and maintained white, to avoid damage due to the intensified heat exposure from reflected sun in such areas.
- J. Insulation shall be [loosely placed, secured] in accordance with membrane manufacturer's requirements. The insulation below the membrane is to be held in place with [ballast, compatible adhesives, mechanical fasteners in conjunction with the overlayment and/or membrane system]. [Mechanical fasteners shall be of sufficient number and adequate pattern to resist displacement of insulation by wind uplift forces.] When adhering or exposing Tapered/fill THERMAPINK[®] or FOAMULAR[®] insulation to hot bitumen, the bitumen must be allowed to cool to between 200°F and 250°F.

3.5 OVERLAYMENT

- A. Only dry overlayment materials shall be used. If overlayment materials become wet, allow them to fully dry before proceeding with roofing application. Requirements for overlayment materials and thickness may vary. Contact membrane manufacturer for their individual requirements.
- B. [Rigid overlayment shall be [mechanically attached, adhered with a suitable adhesive] per manufacturer's recommendations.] Mechanical fastening of insulation and rigid overlayment may coincide so that fastener penetrates overlayment and THERMAPINK[®] or FOAMULAR[®] into the structural substrate the minimum distance prescribed for adequate wind uplift resistance by the fastener manufacturer. [Loose lay flexible sheet overlayment over Tapered [THERMAPINK[®], FOAMULAR[®]] and cover with a membrane attached per the manufacturer's recommendations. Edges and ends of rolls shall be lapped a minimum of 6".]
- C. When cleaning agents and seam adhesives used are solvent based and capable of causing cavitation of the underlying [THERMAPINK[®], FOAMULAR[®]] insulation, use care when preparing membrane edges for in-field seam splicing.



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3.6 BALLAST

- A. If needed. Before selecting this roofing system, it must be determined that the ballast system designed will not exceed the dead load limits of the structure.
- B. Ballasting Requirements:
 - 1. Weight of ballast installed must be sufficient to provide protection against wind uplift pressure. The necessary weight per square foot, gradation and application surface areas shall be determined in accordance with ANSI/SPRI RP-4, Wind Design Guide for Ballasted Single-Ply Roofing Systems.
 - 2. Ballast gradation and quantity installed, i.e., depth must be adequate to completely cover the membrane. Insulation thickness does not affect the amount of ballast required.
 - 3. Protect membrane and place ballast in accordance with membrane manufacturer's instructions.
- C. [For ballasted roofing systems (including PRMA*) with no cover board over the XPS,] black/dark (non-white) roofing membranes (or filtration fabrics in PRMA) over THERMAPINK[®] and FOAMULAR[®] insulation shall be ballasted immediately after placement to prevent potential heat damage from sun exposure and wind displacement of the insulation under the membrane/fabric.
- D. [For mechanically attached and fully adhered roofing systems,] in areas where black/dark membranes are used and where "reflected solar energy" is expected to be present, THERMAPINK[®] and FOAMULAR[®] need protection in addition to normally specified cover boards. For example, roof areas adjacent to higher walls, particularly walls with reflective surfaces, or near large rooftop HVAC units, or near or in between clusters of mechanical equipment, or near other structures with reflective cladding (metal or glass); or near higher reflective parapets, all such areas should be considered for additional heat protection. Such roof areas must be covered with pavers or ballast. Black/dark (non-white) membranes must be coated with white reflective topping, and maintained white, to avoid damage due to the intensified heat exposure from reflected sun in such areas.
- E. [Upon completion of ballasted roof construction the owner's representative must verify that installation is in accordance with design specifications such as adequate ballast gradation, rate of coverage and areas covered.]

3.7 [FASTENERS]

- A. Fastener/stress plate assemblies shall be driven to tightly secure the insulation board and seat the plate but shall not be overdriven so that the Tapered [THERMAPINK[®], FOAMULAR[®]] board is crushed beneath the plate.
- B. Fasteners which are improperly installed shall be removed or corrected. Improper installation may include overdriving such that the stress plate is concave and cuts a significant depression in the insulation; underdriving such that the fastener head is not properly seated in the stress plate and may puncture the membrane; broken or bent shanks; improper location; or insufficient length.
- C. Fasteners shall be embedded in the deck per manufacturer's recommendations to insure adequate withdrawal resistance.
- D. Tapered [THERMAPINK[®], FOAMULAR[®]] shall be secured with 4 fasteners and 3" diameter stress plates per 2' x 8' board.
 - 1. Four fasteners minimum, (install 2 to 4 more to insure greater flatness) one 6" in from the edges of each corner, are required when THERMAPINK[®] or FOAMULAR[®] insulation is installed under white membranes with or without a slip-sheet. Four fasteners, 6" from each corner, are also required when FOAMULAR[®] insulation is installed under a rigid coverboard. The coverboard and



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THERMAPINK[®] or FOAMULAR[®] may be fastened concurrently. The rigid coverboard may require more than 4 fasteners to meet the recommendation of its manufacturer.

END OF SECTION

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