



GreenGuard® XPS Insulation Board

INSTALLATION GUIDELINES

Product

Kingspan GreenGuard® XPS Insulation Board comprises closed-cell extruded polystyrene (XPS) with high water resistance and R-value of 5.0 per inch of thickness. It is available as Type IV in square edge board, ship-lap edge board and a score board and Type VI in square edge or drainage channels.

1. *Kingspan GreenGuard®* XPS Insulation Board CM (square edges 1/2 – 3 in., Type IV and 2-3 in., Type VI);
2. *Kingspan GreenGuard®* XPS Insulation Board SB (scored board: 1-2 in., Type IV);
3. *Kingspan GreenGuard®* XPS Insulation Board DC (drainage channels, 2 in., Type VI);
4. *Kingspan GreenGuard®* XPS Insulation Board SL (ship-lap edges, 1/2 – 2 in., Type IV); and
5. *Kingspan GreenGuard®* SLX Sheathing (film-faced, ship-lap edges, 1/2 – 1 in., Type IV);

Compliance

The installer is responsible for ensuring that the installation is in compliance with building code requirements. The code may have requirements for specific insulation thickness or R-value and materials along with specific thermal or ignition barriers. All assemblies should be evaluated for effectiveness and location of vapor retarders to avoid condensation and subsequent damage to the structures (ASHRAE Handbook of Fundamentals). Since foam sheathings are non-structural, they must be installed over adequately braced framing in accordance with local building codes.

Intertek CCRR 1021;
 CA BEARHFTI Lic. No. TB 1334;
 Florida Product Approval – No. FL14164;
 CCMC 12722-L;
 MN Dept. of Energy – Chapter 7640;
 FM Approvals - see RoofNav Roof System Listings;
 Miami-Dade County, FL - NOA No. 12-0629.04;
 UL LLC® – See Classification Certificate A183.

General

These instructions are intended for use by any individual, whether an experienced installer or homeowner. They are general guidelines and do not cover all aspects of insulation installation and use. As the installer, you have sole responsibility for proper installation of all

materials. You are responsible for adhering to label instructions and using proper safety precautions during installation.

The installation information provided describes some common applications and represents current industry practice. This information is intended to be used as a guide. For information regarding other applications and more detailed product information go to www.kingspaninsulation.us. Alternate installation details may be used if approved in writing by Kingspan Insulation LLC prior to installation.

Personal Protective Equipment

For safe handling, it is recommended that you use OSHA-approved safety glasses, work gloves, and a NIOSH or MSHA approved disposable dust respirator. There is no requirement for re-entry or occupancy times.

Required Tools

For all *Kingspan GreenGuard®* XPS Insulation Board installations, one or more of the following tools will be required:

1. Tape measure
2. Straightedge
3. Utility knife
4. Nail gun
5. Caulk gun
6. Cordless drill
7. Hammer
8. Saw

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Auxiliary Materials

Specify auxiliary materials as shown below or other alternative approved materials:

1. **Kingspan GreenGuard®** Standard Seam Tape and / or Custom Seam Tape
2. **Kingspan GreenGuard®** Butyl Flashing and / or **Kingspan GreenGuard®** SuperStretch™ Butyl Flashing;
3. Adhesives, Sealants and Primers that are compatible with **Kingspan GreenGuard®** Extruded Polystyrene Insulation Board
4. **Kingspan GreenGuard®** Building Wraps for air-sealing wall installations.

Delivery Handling & Storage

1. Deliver insulation board to the project site in original packaging, labeled with manufacturer's information, product name, date of manufacture, and directions for storage.
2. Store insulation board in its original undamaged packaging or in a clean, dry, protected location and within temperature range required by insulation manufacturer. Protect stored materials from direct sunlight.
3. When stored outdoors, all product should be protected from exposure to direct sunlight using the original packaging or an opaque, light-colored tarp. Material that has been unwrapped should be covered or rewrapped.

WARNING: This product is combustible. A protective barrier or thermal barrier is required as specified in the appropriate building code. Protect it from exposure to open flame or other ignition sources during shipping, storage and installation.

Project Conditions

1. Temperature: Maximum service temperature is 165°F. There is no minimum installation temperature. Do not apply insulation board to a damp or wet substrate.
2. Field Conditions: Do not install insulation board in snow, rain, fog, or mist. Do not install insulation board or auxiliary materials when the temperature of substrate surfaces and surrounding air temperatures are above or below those recommended by the auxiliary material manufacturers.

Scheduling

1. Review requirements for sequencing of installation of the insulation board with installation of windows, doors, louvers and flashing materials to ensure a weather-tight air barrier assembly.
2. Schedule installation of exterior cladding within one month of installation of the insulation board.

Examination

1. Examine substrates, areas, and conditions under which the insulation board will be applied, with installer present, for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
2. Review requirements for sequencing of installation of all wall assembly components as demonstrated in the mock-up wall assembly.

Material Performance

1. Thermal Insulation: Provide extruded polystyrene insulation board (XPS) that meets the requirements of ICC-ES AC12, "Acceptance Criteria for Foam Plastic Insulation", ASTM C 578, Type IV and Type VI and CAN/ULC-S701, Type 4.
2. Mechanically-fastened, Air Barrier Material: Provide extruded polystyrene insulation board (XPS) with an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 psf) (0.02 L/sm @ 75 Pa.) when tested in accordance with ASTM E 2178 and shall meet the requirements of CCMC Technical Guide 07273, "Air Barrier Materials" and test reports from accredited testing laboratories shall be made available upon request.
3. Alternate Water-resistive Barrier: Provide extruded polystyrene insulation board (XPS) that meets the requirements of ICC-ES AC71, "Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-resistive Barriers" and test reports from accredited testing laboratories shall be made available upon request.

Connections to Adjacent Materials

1. Do not install product in direct contact with hot surfaces. Specifically avoid contact with chimneys, furnace and water heater flues, lighting fixtures, etc. Maintain spacing in accordance with local codes.
2. Provide connections to prevent air leakage at the following locations:
 - walls, including penetrations, ties and anchors;
 - walls, windows, curtain walls or doors;
 - different wall assemblies, and fixed openings within those assemblies;
 - wall and roof connections;
 - wall control and expansion joints;
 - wall pipe and duct penetrations; and
 - wall seismic and expansion joints.

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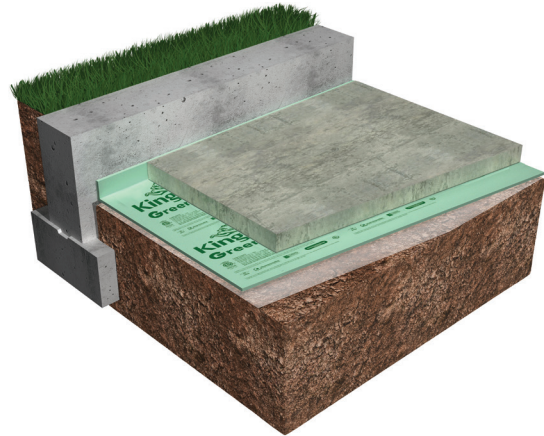
Installation - Below-Grade, Perimeter Foundation Insulation



In order to achieve full thermal performance, boards should be butted securely and, where plumbing, electrical or other penetrations exist, the board should be cut to fit tightly around the penetration. Use caulk, sealant or spray foam to seal around penetrations.

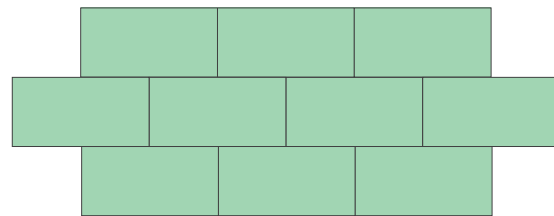
1. Install insulation board to the exterior side of masonry walls after the waterproofing membrane has cured according to the manufacturer's installation instructions. If the surface of the cured waterproofing membrane is not tacky enough to hold the insulation board in place until backfilling takes place, then an adhesive can be used to secure the insulation board to the wall. If the adhesive manufacturer provides instructions for the amount and pattern required for the application, use that. Otherwise, apply a line of adhesive across the board starting at one edge and repeating every 24" to the other edge. Many common adhesives are compatible with **Kingspan GreenGuard® XPS Insulation Board**. Go to www.kingspaninsulation.us and refer to Technical Bulletin 11- Adhesive, Spray Foam and Primer Compatibility.
2. Begin by aligning the first board at a corner of the structure making sure that the bottom fits snugly to the flashing over the footer.
3. Place backfill directly in contact with the insulation board. Remove all large rocks and other debris that may damage insulation board during backfilling.
4. Do not leave **Kingspan GreenGuard® XPS Insulation Board** exposed above grade. If insulation board is exposed above the grade line, then it must be covered with an exterior cladding material or foundation covering.

Installation - Below-Grade, Slab-On-Grade Insulation

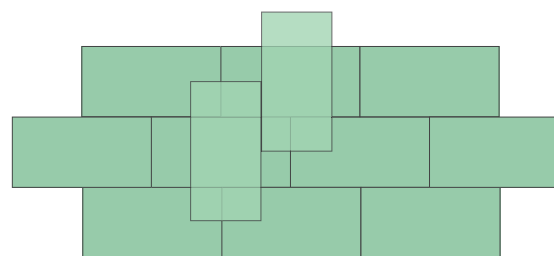


In order to achieve full thermal performance, boards should be butted securely and, where plumbing, electrical, ventilation or other penetrations exist, the board should be cut to fit tightly around the penetration.

1. Place a 6-mil polyethylene vapor retarder sheet over graded, smooth dry, well tamped fill. Lap sheet a minimum of 2 in. and extend vertically up the perimeter foundation wall a minimum of 2 in.
2. Lay **Kingspan GreenGuard® XPS Insulation Board** over the vapor retarder sheet, cutting to size as necessary. Place adjacent insulation boards with joints staggered. Place subsequent layers of insulation board over the lower layer with boards placed perpendicular to the previous layer with joints staggered.



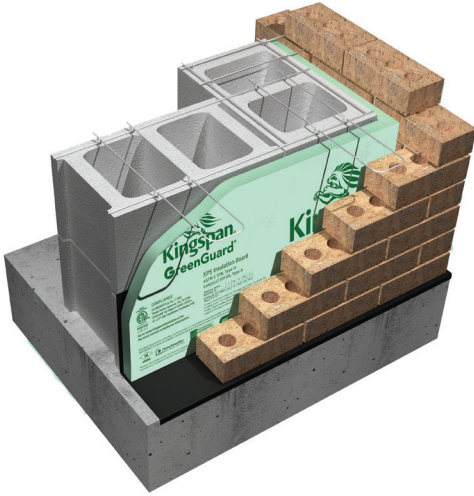
1-Layer Staggered-Joint Pattern



2-Layer Staggered-Joint Pattern

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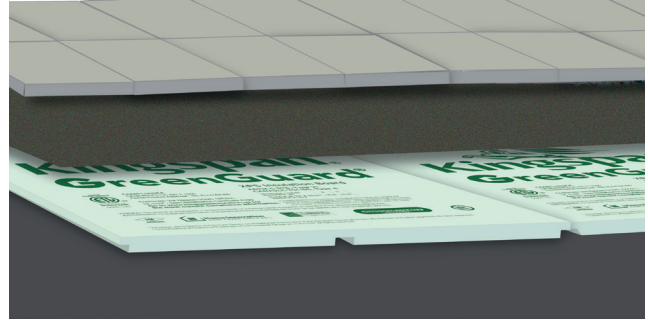
Installation - Exterior Cavity Wall Insulation



In order to achieve full thermal performance, boards should be butted securely and, where plumbing, electrical or other wall penetrations exist, the board should be cut to fit tightly around the penetration. Use caulk, sealant or spray foam to seal around penetrations.

1. Install insulation board against the masonry wall by friction, fitting boards between masonry wall ties, or using an adhesive. If an adhesive is used, apply the adhesive over the board as 1" spots, 3/4" high at 8" to 12" on center, or as 3/8" parallel beads 12" to 16" the full length of the board. For a list of compatible adhesives go to www.kingspaninsulation.us and see Technical Bulletin #11- Adhesive, Spray Foam and Primer Compatibility.
2. Begin by aligning the first board at a corner of the structure making sure that the bottom of the board fits all the way to the flashing at the footer and the full surface area of the wall is covered by the insulation. Adjacent insulation board seams must be staggered and all board edges must be firmly butted together.
3. Install the exterior veneer in accordance with the manufacturer's installation instructions.

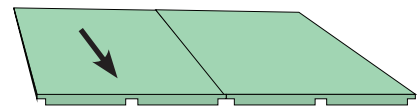
Installation - Residential Paver Roof System Insulation



This installation is employed to provide insulation outside of the roof membrane and to a base and drainage plane to the final roof finish of flat paver blocks or ballast. It is commonly referred to as a Protected Membrane Roof Assembly (PMRA). In order to achieve full thermal performance, boards should be butted securely and, where plumbing, electrical, ventilation or other penetrations exist, the board should be cut to fit tightly around the penetration.

1. Examine the roof deck for suitability to receive insulation board. Verify that the roofing membrane system is installed correctly and properly sealed and that the substrate is dry, clean and free of foreign materials that may damage insulation or the membrane.
2. Verify that roof drains, scuppers, roof curbs, nailers, equipment supports, vents and other roof accessories are secured properly.
3. Start of installation indicates that the installer accepts the conditions of the roof deck surfaces.

4. Place **Kingspan GreenGuard® Type VI Drainage Channel Board**



- with the cut-away channels facing down and the long dimension of the board in the same direction as intended drainage.
5. Begin by aligning the first board at a corner of the structure making sure that the entire roof surface is covered with insulation.
 6. Do not apply fasteners to the insulation. Install only as much insulation board as can be covered by the roofing materials in the same day.
 7. Cover the insulation board with a filter fabric.
 8. Cover the filter fabric with flat pavers (do not use pedestal pavers with this product) or ballast.

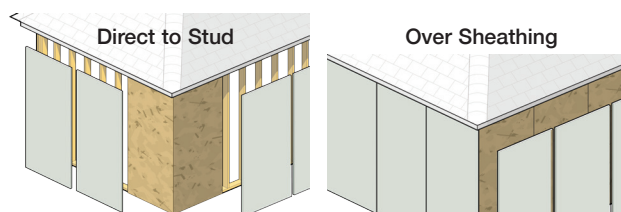
Refer to the UL LLC (UL) Roofing Materials Guide and the FM Approvals "RoofNav" for approved roof assemblies that incorporate extruded polystyrene insulation board (XPS).

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Installation- Exterior Continuous Insulation,
Air Sealing and Weather-Resistive Barrier



Kingspan **GreenGuard**® XPS Insulation Board may be installed directly to wall studs as insulating sheathing or over a wall completely sheathed with wood sheathing as Continuous Insulation (Ci). This product is not a structural bracing, therefore, when installed directly to studs, must be combined with wood sheathing, or special bracing to achieve wall structural requirements. Check local building codes for specific bracing requirements and alternatives.



1. Begin by aligning the first board at a corner of the structure making sure that the bottom of the board overlaps the sill plate.
2. Run a bead of sealant along the face of the sill plate and press the insulation board into the sealant bead to form a seal.
3. Insulation boards must be installed with the board length in the vertical direction on the wall. Vertical joints must be located over framing members or be backed.
4. Cut board tightly around openings and penetrations.
5. Attach the insulation board using fasteners that are appropriate for the framing type.

Fastener Types Chart

Application	Fastener Type	Fastener Length
Wood Stud	Annular thread with 1 in. plastic cap nail or common galvanized roofing nails.	Long enough to extend into the framing a minimum of 3/4 in.
Steel Stud	HiLo thread sharp point screws with plastic screw caps	

Fastening Patterns

Continuous Insulation over Wood Sheathing

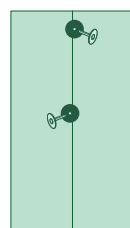
Place nails at 24" inch intervals vertically along stud locations at the edge of the board, then alternating fasteners in the center section of each board.

Insulating Sheathing -Direct To Stud

Place nails at 24" inch intervals vertically along all stud locations, nailing into each stud. (If stud placement is at 16" centers, place a vertical row of fasteners every 16" horizontally).



24 in



Along board edges, use shared fasteners. Alternate fasteners between adjacent boards with the caps overlapping the joint

6. Seal all gaps, penetrations and repair damaged areas using a silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, use expanding spray foam complying with AAMA 812, or use either *Kingspan* **GreenGuard**® Seam Tape or *Kingspan* **GreenGuard**® Butyl Flashing.
7. Tape all seams using *Kingspan* **GreenGuard**® Seam Tape.
8. Use *Kingspan* **GreenGuard**® Butyl Flashing to seal around doors, windows and other wall penetrations. Use of other seam tape and self-adhering flashings must be approved by Kingspan Insulation LLC prior to installation.
9. Install the exterior siding or cladding in accordance with the installation supplied by the manufacturer of the cladding. Refer to Table R703.4 of the International Residential Code (IRC) for attachment requirements for siding materials.

For more information on specific building product recommendations and installation guidelines, contact your Kingspan Insulation LLC representative.

For the most current product and compliance information go to www.kingspaninsulation.us.

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