SECTION 07 22 17

VACUUM INSULATION PANELS FOR ROOFING

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\*\* NOTE TO SPECIFIER \*\* Kingspan Insulation LLC; insulation and wraps.
This section is based on the products of Kingspan Insulation LLC, which is located at:2100 RiverEdge Parkway, Suite 175Atlanta, GA 30328Toll Free Tel: 800-241-4402Tel: 678-589-7300Fax: 678-589-7325Email: [request info (info@kingspaninsulation.us)](https://arcat.com/rfi?action=email&company=Kingspan%252BInsulation%252BLLC&message=RE%253A%2520Spec%2520Question%2520(07223ksp)%253A%2520&coid=49893&spec=07223ksp&rep=&fax=678-589-7325)
Web: <https://www.kingspan.com/us/en-us/about-kingspan/kingspan-insulation>
 [ [Click Here](https://arcat.com/company/kingspan-insulation-llc-49893) ] for additional information.
Kingspan Insulation LLC is a leading manufacturer in energy efficiency and moisture management products, offering high performance insulation, building wraps and pre-insulated HVAC ductwork. Kingspan Insulation is part of the Kingspan Group plc, a global leader in a range of product divisions including pre-insulated building panels, environmental technologies and renewable energy technologies. Its products are among the most thermally efficient and technologically advanced insulation materials available.
Kingspan's integrated approach has made its products first choice with architects, contractors, developers and owners. Kingspan's products help reduce the impact buildings have on the environment throughout their lifecycle. Kingspan Group plc has been identified as a global leader for its actions and strategies in response to climate change and has been awarded a position on The Climate "A" List by CDP.

1. GENERAL
	1. SECTION INCLUDES

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

* + 1. Rigid vacuum insulation panels for the following:
			1. Single ply roofing system.
			2. Inverted roofing system
			3. Balcony and terrace system.
	1. RELATED SECTIONS

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

* + 1. Section 07 50 00 - Membrane Roofing.
	1. REFERENCES

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

* + 1. ASTM International (ASTM):
			1. ASTM C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
			2. ASTM C1667 - Standard Test Method for Using Heat Flow Meter Apparatus to Measure the Center-of-Panel Thermal Transmission Properties of Vacuum Insulation Panels.
			3. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
		2. British Standards Institution (BS).
		3. ETL Intertek.
		4. European Standards (EN): BS EN 1602 - Thermal Insulating Products for Building Applications. Determination of the Apparent Density.
		5. International Code Building (IBC).
		6. International Residential Code (IRC).
		7. Factory Mutual (FM).
		8. Underwriters Laboratories, UL LLC (UL).
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Submit insulation manufacturer's product data, Code Compliant Research Report and test reports along with the insulation manufacturer's printed installation guidelines.
			1. Submit product literature or a letter from the insulation manufacturer indicating approval of products not manufactured by the specified insulation manufacturer.
			2. If a letter is submitted, it shall include a statement that materials are compatible with adjacent materials proposed for use.
		3. Samples: Submit clearly labeled samples, 5 inches by 7 inches (127 mm by 177.8 mm) minimum size of each material specified.
		4. Shop Drawings of Mock-Up: Submit shop drawings of proposed assembly mock-ups showing the location of the insulation board in the roof assembly and location of penetrations and terminations.
	2. QUALITY ASSURANCE
		1. Insulation Manufacturer: Obtain insulation board from a single manufacturer regularly engaged in manufacturing vacuum insulated panels of type specified. Obtain secondary materials from a source acceptable to the primary insulation manufacturer.
		2. Product shall have a current Code Compliant Research Report from a testing agency certifying physical properties, thermal resistance and installation code compliant with International Code Building (IBC), and International Residential Code (IRC).
		3. Installer qualifications:
			1. Installer shall have experience with installation of insulation panels. Installation shall be in accordance with insulation manufacturer's installation guidelines.
			2. Minimum 2 year experience installing similar products.

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

* + 1. Assembly Mock-Up: Build a mock-up representative of assemblies using specified insulation and other related auxiliary materials following the insulation manufacturer's installation guidelines. Mock-up shall be approximately 8 by 8 feet wide (2.4 by 2.4 m).
	1. PRE-INSTALLATION MEETINGS
		1. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this Section. Agenda shall include, at a minimum, review of assembly mock-up drawings, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Deliver insulation to the project site in original packaging, labeled with manufacturer's information, product name, and date of manufacture, and instructions 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. Manufacturer's packaging is not adequate for outdoor storage.
		3. Handling: Handle materials to avoid damage.
			1. Panels cannot come into contact with solvent based adhesive systems, solvents, or acids.
			2. Avoid foot traffic over panels until protection layers and final finish has been installed.
	3. PROJECT CONDITIONS
		1. Temperature: Install insulation panels within range of ambient and substrate temperatures recommended by the insulation manufacturer. Do not apply insulation board to a damp or wet substrate.
		2. Field Conditions: Do not install insulation panels in snow, rain, fog, or mist. Do not install insulation panel or auxiliary materials when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the insulation and auxiliary material manufacturers.
	4. SEQUENCING
		1. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
		2. Review requirements for sequencing of installation of the insulation panels with installation of roofing items, equipment, and flashing materials to ensure a weather-tight air barrier assembly.
	5. WARRANTY

\*\* NOTE TO SPECIFIER \*\* Verify warranty length with the insulation manufacturer.

* + 1. Material Warranty: Provide insulation manufacturer's warranty.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Kingspan Insulation LLC, which is located at:2100 RiverEdge Parkway, Suite 175Atlanta, GA 30328Toll Free Tel: 800-241-4402Tel: 678-589-7300Fax: 678-589-7325Email: [request info (info@kingspaninsulation.us)](https://arcat.com/rfi?action=email&company=Kingspan%252BInsulation%252BLLC&message=RE%253A%2520Spec%2520Question%2520(07223ksp)%253A%2520&coid=49893&spec=07223ksp&rep=&fax=678-589-7325);Web: <https://www.kingspan.com/us/en-us/about-kingspan/kingspan-insulation>

\*\* 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 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Kingspan OPTIM-R has high R-values and ultra-thin insulation with optimum performance vacuum insulated panel. An optimum performance next generation insulation product. It is a rigid vacuum insulation panel comprising a microporous core, which is evacuated, encased and sealed in a thin, gas-tight envelope to give outstanding With an R-value as high as R-56.782 for a 2" panel thickness, Kingspan OPTIM-R provides an insulating performance that is up to 5 x better than other commonly available building insulation materials. Kingspan OPTIM-R is available in a range of board dimensions in different thicknesses to suit various applications, including roofs, walls and floors and in OEM systems.

* 1. RIGID VACUUM INSULATION PANELS
		1. Basis of Design: Kingspan OPTIM-R Roofing System Rigid Vacuum Insulation Panels (VIP) as manufactured by Kingspan Insulation LLC.
			1. Construction: Rigid vacuum insulation panels with a micro- porous core which is evacuated, encased and sealed in a thin, gas-tight envelope, giving outstanding thermal resistance, with the thinnest possible solution to insulation problems. The vacuum insulation panels are accompanied with insulation (PIR or XPS) infill panels which can be cut to fit around problem areas such as skylights or other roofing penetrations.
			2. Dimensions:
				1. Width: 11.8 - 23.6 inches (300 - 600 mm)
				2. Length: 11.8 - 47.2 inches (300 - 1200 mm)
				3. Thickness: 0.79 inch (20 mm).
				4. Thickness: 0.98 inch (25 mm).
				5. Thickness: 1.18 inch (30 mm).
				6. Thickness: 1.57 inch (40 mm).
				7. Thickness: 1.97 inch (50 mm).
			3. Mold and microbial growth resistant. No food value to insects or rodents.
		2. Infill Strips:
			1. Basis of Design: Infill Strips as manufactured by Kingspan Insulation LLC.
				1. High performance insulation (PIR or XPS).

R-Value: 5.0 per inch (127 mm) thickness.

* + 1. Overlay:
			1. Basis of Design: Overlay as manufactured by Kingspan Insulation LLC.
	1. PERFORMANCE REQUIREMENTS
		1. Standards Compliance:
			1. Certified to ASTM C1667.
			2. Certified to ASTM C165.
			3. Certified to ASTM D2126.
			4. ETL listed.
			5. UL listed.
			6. FM approved.
		2. Properties.
			1. Compressive Strength per ASTM C165: 25 psi ( kPa) at 10 percent deformation.
			2. Service Temperature: Minus 40 to 176 degrees F (minus 40 to 80 degrees C)
			3. Density per BS EN 1602: 11.25 to 13.10 lbs per cu ft (180 to 210 kg per cu m)
			4. All materials to be chemically inert and safe to use and handle.
			5. Thermal Resistance per ASTM C1667: Center panel thermal resistance.
				1. Insulation Thickness: 0.79 inch (20 mm). R-Value: 26.
				2. Insulation Thickness: 0.98 inch (25 mm). R-Value: 32.
				3. Insulation Thickness: 1.18 inch (30 mm). R-Value: 37.
				4. Insulation Thickness: 1.57 inch (40 mm). R-Value: 49.
				5. Insulation Thickness: 1.97 inch (50 mm). R-Value: 60.

\*\* NOTE TO SPECIFIER \*\* Edge effect R-values vary based on panel size. The listed edge effect R-values in the table are based on the average edge effect R-values from six of the most commonly used panel sizes.

* + - 1. Calculated Edge Effect Thermal Resistance Properties: Based on ASTM C1667.
				1. Insulation Thickness: 0.79 inch (20 mm). R-Value: 22.
				2. Insulation Thickness: 0.98 inch (25 mm). R-Value: 28.
				3. Insulation Thickness: 1.18 inch (30 mm). R-Value: 33.
				4. Insulation Thickness: 1.57 inch (40 mm). R-Value: 46.
				5. Insulation Thickness: 1.97 inch (50 mm). R-Value: 57.
			2. Dimensional Stability per ASTM D2126: 336 hours at (70 degrees C) and 97 percent relative humidity.
				1. Thickness of 0.79 inch (20 mm):

Length: Minus 0.47 percent

Width: Minus 0.59 percent

* + - * 1. Thickness of 1.97 inch (50 mm):

Length: Minus 0.30 percent

Width: Minus 0.13 percent

* + - 1. Nominal Panel Mass:
				1. Thickness of 0.79 inch (20 mm): 0.82 lbs per sq ft (4 kg per sq m).
				2. Thickness of 0.98 inch (25 mm): 1.02 lbs per sq ft (4 kg per sq m).
				3. Thickness of 1.18 inch (30 mm): 1.23 lbs per sq ft (4 kg per sq m).
				4. Thickness of 1.57 inch (40 mm): 1.43 lbs per sq ft (4 kg per sq m).
				5. Thickness of 1.97 inch (50 mm): 1.64 lbs per sq ft (8 kg per sq m).
1. EXECUTION
	1. EXAMINATION
		1. Examine substrates, areas, and conditions under which insulation panels will be applied, with installer present, for compliance with requirements. Verify surfaces and conditions are suitable prior to commencing work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
		2. The substrate must be clean, dry and level, and free of sharp objects or edges.
	2. INSTALLATION
		1. Insulation boards shall be installed per manufacturer's published installation instructions, and applicable codes. The manufacturer's published installation instructions shall be strictly adhered to, and a copy of the instructions shall be available on the jobsite during installation.
			1. Panels should be laid break bonded where practical, with joints lightly butted. There should be no gaps at abutments.
			2. Where runs of panels do not accurately fit the dimension of the roof, the use of Kingspan infill strips is required to make up this difference.
				1. Strips to be the same thickness as the panels.
				2. Cutting should be carried out either by using a fine toothed saw, or by scoring with a sharp knife, snapping the board over a straight edge and then cutting the facing on the other side.
				3. Ensure accurate trimming of infill to achieve close-butting joints and continuity of insulation.
			3. Kingspan Optim-R or Kingspan Optim-R infill panels should be restrained to the roof substrate using a suitable adhesive and / or double sided adhesive tape or overburden. See project specific details.
			4. Kingspan overlay should be laid as soon as possible to avoid exposure of the Kingspan Optim-R to direct foot traffic.
			5. At the perimeter of the roof and where upstands or any penetrations (e.g. drainage outlets) are present, Kingspan infill strips should be laid abutting these areas, to take account of building tolerances.
			6. A minimum distance of 12 inch (305 mm) should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
			7. Roofing System VIP panels can be laid in any weather, but care must be taken in windy conditions.
			8. Insulation can be lifted to allow inspection of the waterproofing system.
			9. Additional insulation can be added at a later date on top of the VIP panels.
			10. Kingspan wind uplift warranty is available.
	3. FIELD QUALITY CONTROL
		1. Owner's Inspection and Testing: Cooperate with Owner's testing agency. Allow access to work areas and staging. Notify Owner's testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection. Daily inspection and testing may be required. Do not cover Work of this section until testing and inspection is accepted.
		2. Do Not Do the Following.
			1. Walk directly on panels. A protective foot or crawl board should be used during the installation process.
			2. Expose panels to solvent based adhesive systems.
			3. Expose panels to excessive heat or open flames.
			4. Cut or puncture panels. Replace any cut or punctured panels.
	4. PROTECTING AND CLEANING
		1. Protect insulation board from damage during installation and remainder of construction period, according to manufacturer's written instructions.
			1. Coordinate with installation of insulation panels to ensure exposure periods do not exceed the manufacturer's recommendations.

END OF SECTION