SECTION 07 21 13

PHENOLIC INSULATION

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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(07211ksp)%253A%2520&coid=49893&spec=07211ksp&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.

1. GENERAL
   1. SECTION INCLUDES

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

* + 1. Rigid thermoset phenolic insulation board of the following types:
       1. Cavity board, for partial fill cavity wall insulation. (Kooltherm K8)
       2. Internal insulation board, for basement/crawl space/attic walls. (Kooltherm K9)
       3. Soffit board, for structural ceilings and soffits. (Kooltherm K10)
       4. Framing board, for wood and steel framing systems. (Kooltherm K12)
       5. Rainscreen board, for rainscreen cladding systems. (Kooltherm K15)
       6. Concrete sandwich board, for concrete sandwich wall systems. (Kooltherm K20)
  1. RELATED SECTIONS

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

* + 1. Section 03 30 00 - Cast-in-Place Concrete Cast-In-Place Concrete; requirement that backup concrete be free of fins, protrusions and large holes.
    2. Section 04 20 00 - Unit Masonry Masonry Units; requirement that backup masonry joints are flush and completely filled with mortar, and that excess mortar on brick ties will be removed; requirement for gap at deflection joints and fillers; coordination with sequencing of through-wall flashing.
    3. Section 04 21 13 - Brick Masonry Insulated Concrete Unit Masonry; for insulation installed in cavity walls and on the interior of concrete block and monolithic walls.
    4. Section 06 16 36 - Wood Panel Product Sheathing Insulating Sheathing; for insulation board installed over Steel or Wood framing members.
    5. Section 06 16 36 - Wood Panel Product Sheathing Sheathing; requirement that backup gypsum sheathing has been installed with damaged corners repaired, joints filled and surface flush with compatible material as acceptable to the insulation manufacturer; requirement for gap at deflection joints and fillers.
    6. Section 07 10 00 - Dampproofing and Waterproofing Damproofing and Waterproofing; for insulation installed over waterproofing membrane materials, such as Self-Adhering Sheet Waterproofing, Elastomeric Sheet Waterproofing, Thermoplastic Sheet Waterproofing, Hot Fluid-Applied Rubberized Asphalt Waterproofing, Cold Fluid-Applied Waterproof-mg.
    7. Section 07 27 19 - Plastic Sheet Air Barriers Vapor Retarder; requirement that vapor retarder materials are installed in accordance with industry standards.
    8. Section 07 27 19 - Plastic Sheet Air Barriers Mechanically-fastened, Membrane Air Barriers; requirement that membrane air barriers are installed in accordance with industry standards.
    9. Section 07 27 23 - Board Product Air Barriers Board Product Air Barriers; for insulation installed as the primary air barrier in an exterior wall assembly.
    10. Section 07 28 00 - Underlayments\* Water-resistive Barriers; requirement that water-resistive barrier materials are installed in accordance with industry standards.
    11. Section 07 40 00 - Roofing and Siding Panels Wall Panels; for insulation installed behind various types of exterior wall panels, such as metal, wood, plastic, composite wall panels and fabricated wall panels.
    12. Section 07 46 16 - Aluminum Siding Siding; for insulation installed behind various types of siding materials, such as cement-fiber, vinyl and wood.
    13. Section - Curtain Wall and Glazed Assemblies; for insulation installed in wall assemblies with glazed aluminum curtain walls, glazed bronze curtain walls and glazed stainless steel curtains walls.
  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 C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
       2. ASTM C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
       3. ASTM C1126 - Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
       4. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
       5. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
       6. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
       7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
       8. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
       9. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
    2. Code Compliance Research Report: CCRR-1066 issued by Intertek.
    3. FM Approvals, Subsidiary of FM Global:
       1. FM 4880 - Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coating and Exterior Wall Systems.
    4. National Fire Protection Association (NFPA):
       1. NFPA 285 - Standard Fire Test Method for Evaluation of Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
       2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
    5. UL Certification: FWFO - Exterior Wall Systems.
  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 Wall Assembly Mock-Up: Submit shop drawings of proposed wall assembly mock-ups showing the location of the insulation board in the wall assembly and location of all wall window and door openings, penetrations and terminations involving structures attached to the exterior wall, i.e., decks, shelf angles, roof-wall intersections, etc.
  2. QUALITY ASSURANCE
     1. Insulation Manufacturer: Obtain insulation board from a single manufacturer regularly engaged in manufacturing phenolic insulation board of type specified. Obtain secondary materials from a source acceptable to the primary insulation manufacturer.
     2. Accredited Laboratory Testing for phenolic insulation board: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).
     3. Product shall have a current Code Compliant Research Report from a testing agency certifying physical properties, surface-burning characteristics, thermal resistance and attic /crawl space installation code compliant with 2015 and 2012 International Code Building (IBC), 2015 and 2012 International Residential Code (IRC) and 2015 and 2012 International Energy Conservation Code (IECC).
     4. Installer qualifications:
        1. Installer shall have experience with installation of water-resistive barriers, air barrier materials and insulation board. 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. Wall Assembly Mock-Up: Build a mock-up representative of primary exterior wall assemblies using all specified insulation and other related auxiliary materials following the insulation manufacturer's installation guidelines. Mock-up shall be approximately 8 feet long by 8 feet high (2.4 m by 2.4 m) and include all components in the exterior wall assembly.
  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 wall 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 board 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.
     3. Handling: Handle materials to avoid damage.
  3. PROJECT CONDITIONS
     1. Temperature: Install insulation board 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 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 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 board with installation of windows, doors, louvers and flashing materials to ensure a weather-tight air barrier assembly.
     3. Schedule installation of exterior cladding within one month of installation of the insulation board.
  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(07211ksp)%253A%2520&coid=49893&spec=07211ksp&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 Kooltherm® offers an extensive range of premium performance insulation products for wall, floor, soffit and rainscreen applications. It has a fiber-free rigid thermoset phenolic insulation core that resists both moisture and water vapor ingress, and exhibits class leading fire performance. When installed correctly, Kooltherm can provide reliable long term thermal performance over the lifetime of the building.  
\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm® K8 Cavity Board is a premium performance insulation, with a fiber- free rigid thermoset phenolic core, faced on both sides with a low emissivity composite foil facing which is used for insulation in partially filled cavity walls.  
The core of Kingspan Kooltherm® K8 Cavity Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC CAVITY BOARD
     1. Product: Kooltherm K8 Cavity Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for cavity walls. Clear cavity is maintained - resists moisture penetration.
        2. Construction: Fiber- free rigid thermoset phenolic core, faced on both sides with a low emissivity composite foil facing. Low emissivity foil facings significantly increase the thermal resistance of the cavity.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R 6.8 per inch.
           1. Thickness, 1.18 inches (30mm): R-Value: 8.0.
           2. Thickness, 1.57 inches (40mm): R-Value: 10.6.
           3. Thickness, 1.97 inches (50mm): R-Value: 13.3.
           4. Thickness, 2.36 inches (60mm): R-Value: 16.0.
           5. Thickness, 2.76 inches (70mm): R-Value: 18.7.
           6. Thickness, 2.95 inches (75mm): R-Value: 20.0.
           7. Thickness, 3.15 inches (80mm): R-Value: 21.4.
           8. Thickness, 3.54 inches (90mm): R-Value: 24.0.
           9. Thickness, 3.94 inches (100mm): R-Value: 26.7.
        5. Fire Performance, ASTM E84: 25 flamespread, 20 smoke developed.
        6. Assembly Performance: Passes NFPA 285 for Types I, II, III or IV construction.
        7. Compressive Strength, Min. (psi), ASTM D1621: 16.
        8. Water Absorption, Max (percent by volume). ASTM C209: 1.15.
        9. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        10. Closed Cell Content (percent of cells closed), ASTM D6226: 94.67.
        11. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at1.57 psf (0.002 /(s.m2) at 75 Pa).
        12. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.51.

\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm® K9 Internal Insulation Board is a premium performance insulation, with a glass tissue based facing. The product is used for basement, crawl space, attic and habitable space wall applications.  
The core of Kingspan Kooltherm® K20 Concrete Sandwich Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC INTERNAL INSULATION BOARD
     1. Product: Kooltherm K9 Internal Insulation Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for basement, crawl space, attic and habitable space wall applications.
        2. Construction: Fiber-free rigid thermoset insulation core with a glass tissue based facing.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R-Value 7.4 per inch.
        5. Fire Performance, ASTM E84: 5 flamespread, 5 smoke developed.
        6. Fire Performance, NFPA 286: Approved.
        7. Compressive Strength, Min. (psi), ASTM D1621: 16.
        8. Water Absorption, Max (percent by volume), ASTM C209: 1.21.
        9. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        10. Closed Cell Content (% of cells closed), ASTM D6226: 94.67.
        11. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at 1.57 psf (0.002 /(s.m2) at 75 Pa).
        12. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.79.

\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm K10 FM Soffit Board is a premium performance insulation with a fiber-free rigid thermoset phenolic core, a glass tissue based facing on its front surface and low emissivity composite foil on its reverse surface which is used for structural ceilings. It is resistant to the passage of water vapor, unaffected by air infiltration, and provides a higher R-value per inch than any commonly used insulation.  
The core of Kingspan Kooltherm® K10 FM Soffit Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC SOFFIT BOARD
     1. Product: Kooltherm K10 Soffit Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for structural ceilings (soffits).
        2. Construction: Fiber-free rigid thermoset phenolic core, a glass tissue based facing on its front surface and low emissivity composite foil on its reverse surface.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R 7.0 per inch.
           1. Thickness, 1.57 inches (40mm): R-Value: 10.9.
           2. Thickness, 1.97 inches (50mm): R-Value: 13.7.
           3. Thickness, 2.36 inches (60mm): R-Value: 16.5.
           4. Thickness, 2.95 inches (75mm): R-Value: 20.6.
           5. Thickness, 3.94 inches (100mm): R-Value: 27.3.
        5. Fire Performance, ASTM E84: 25 flamespread, 20 smoke developed.
        6. Fire Performance, NFPA 286: Approved.
        7. FM Approvals, FM 4880: Approved.
        8. Compressive Strength, Min. (psi), ASTM D1621: 16.
        9. Water Absorption, Max (percent by volume), ASTM C209: 1.0.
        10. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        11. Closed Cell Content (% of cells closed), ASTM D6226: 94.67.
        12. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at 1.57 psf (0.002 /(s.m2) at 75 Pa).
        13. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.48.

\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm® K12 Framing Board is a premium performance insulation, with a fiber- free rigid thermoset phenolic insulation core faced on both sides with a low emissivity composite foil facing which is used in wood or steel frame walls. It is resistant to the passage of water vapor, unaffected by air infiltration, and can be used between studs or as an insulating sheathing,  
The core of Kingspan Kooltherm® K12 Framing Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC FRAMING BOARD
     1. Product: Kooltherm K12 Framing Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for wood and steel framing systems. Can be used between studs or as an insulating sheathing. Suitable for use with wood frame and steel frame wall construction.
        2. Construction: Fiber- free rigid thermoset phenolic insulation core faced on both sides with a low emissivity composite foil facing.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R 6.8 per inch.
           1. Thickness, 1.18 inches (30mm): R-Value: 8.0.
           2. Thickness, 1.57 inches (40mm): R-Value: 10.6.
           3. Thickness, 1.97 inches (50mm): R-Value: 13.3.
           4. Thickness, 2.36 inches (60mm): R-Value: 16.0.
           5. Thickness, 2.76 inches (70mm): R-Value: 18.7.
           6. Thickness, 2.95 inches (75mm): R-Value: 20.0.
           7. Thickness, 3.15 inches (80mm): R-Value: 21.4.
           8. Thickness, 3.54 inches (90mm): R-Value: 24.0.
           9. Thickness, 3.94 inches (100mm): R-Value: 26.7.
        5. Fire Performance, ASTM E84: 25 flamespread, 20 smoke developed.
        6. Assembly Performance: Passes NFPA 285 for Types I, II, III or IV construction.
        7. Compressive Strength, Min. (psi), ASTM D1621: 16.
        8. Water Absorption, Max (percent by volume). ASTM C209: 1.15.
        9. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        10. Closed Cell Content (percent of cells closed), ASTM D6226: 94.67.
        11. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at1.57 psf (0.002 /(s.m2) at 75 Pa).
        12. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.51.

\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm® K15 Rainscreen Board is a premium performance insulation, with a fiber- free rigid thermoset phenolic insulation core faced on both sides with a low emissivity composite foil facing. The product is used as insulation for rainscreen cladding systems.  
The core of Kingspan Kooltherm® K15 Rainscreen Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC RAINSCREEN BOARD
     1. Product: Kooltherm K15 Rainscreen Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for rain screen cladding systems.
        2. Construction: Fiber- free rigid thermoset phenolic insulation core faced on both sides with a low emissivity composite foil facing.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R 6.8 per inch.
           1. Thickness, 1.18 inches (30mm): R-Value: 8.0.
           2. Thickness, 1.57 inches (40mm): R-Value: 10.6.
           3. Thickness, 1.97 inches (50mm): R-Value: 13.3.
           4. Thickness, 2.36 inches (60mm): R-Value: 16.0.
           5. Thickness, 2.76 inches (70mm): R-Value: 18.7.
           6. Thickness, 2.95 inches (75mm): R-Value: 20.0.
           7. Thickness, 3.15 inches (80mm): R-Value: 21.4.
           8. Thickness, 3.54 inches (90mm): R-Value: 24.0.
           9. Thickness, 3.94 inches (100mm): R-Value: 26.7.
        5. Fire Performance, ASTM E84: 25 flamespread, 20 smoke developed.
        6. Assembly Performance: Passes NFPA 285 for Types I, II, III or IV construction.
        7. Compressive Strength, Min. (psi), ASTM D1621: 16.
        8. Water Absorption, Max (percent by volume). ASTM C209: 1.15.
        9. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        10. Closed Cell Content (percent of cells closed), ASTM D6226: 94.67.
        11. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at1.57 psf (0.002 /(s.m2) at 75 Pa).
        12. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.51.

\*\* NOTE TO SPECIFIER \*\* Kingspan Kooltherm® K20 Sandwich Board is a premium performance insulation, with a fiber-free rigid thermoset insulation core faced on both sides with a glass tissue based facing. The product is used for concrete sandwich wall systems.  
The core of Kingspan Kooltherm® K20 Concrete Sandwich Board is a premium performance rigid thermoset fiber-free phenolic insulation manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP). Delete if not required.

* 1. RIGID THERMOSET PHENOLIC CONCRETE SANDWICH BOARD
     1. Product: Kooltherm K20 Concrete Sandwich Board as manufactured by Kingspan Insulation LLC.
        1. Application: Rigid thermoset insulation for concrete sandwich wall systems.
        2. Construction: Fiber-free rigid thermoset insulation core faced on both sides with a glass tissue based facing.
        3. Blowing Agent: Zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), and both HCFC and CFC free.
        4. Thermal Resistance, ASTM C518: R 7.4 per inch.
           1. Thickness, 1.57 inches (40mm): R-Value: 11.6.
           2. Thickness, 1.97 inches (50mm): R-Value: 14.5.
           3. Thickness, 2.36 inches (60mm): R-Value: 17.4.
           4. Thickness, 2.76 inches (70mm): R-Value: 20.4.
           5. Thickness, 2.95 inches (75mm): R-Value: 21.8.
           6. Thickness, 3.15 inches (80mm): R-Value: 23.3.
           7. Thickness, 3.54 inches (90mm): R-Value: 26.1.
           8. Thickness, 3.94 inches (100mm): R-Value: 29.1.
           9. Thickness, 4.72 inches (120mm): R-Value: 34.9.
        5. Fire Performance, ASTM E84: 5 flamespread, 5 smoke developed.
        6. Assembly Performance: Passes NFPA 285 for Types I, II, III or IV construction.
        7. Compressive Strength, Min. (psi), ASTM D1621: 16.
        8. Water Absorption, Max (percent by volume). ASTM C209: 1.21.
        9. Density, Min. (lb/ft3), ASTM D1622: 2.0.
        10. Closed Cell Content (percent of cells closed), ASTM D6226: 94.67.
        11. Air Permeance, ASTM E2178: 0.000 cfm/ft2 at1.57 psf (0.002 /(s.m2) at 75 Pa).
        12. Water Vapor Permeance (perm), ASTM E96 for 25 mm thick board: 0.79.

2.8\*\* NAUXILIARY MATERIALS  
\*\* NOTE TO SPECIFIER \*\* Specify auxiliary materials as shown below or other alternative materials approved by the insulation manufacturer: Delete materials not required.

* + 1. Tape: Kingspan GreenGuard Standard Seam Tape and / or Custom Seam Tape.
    2. Tape: Kingspan self- adhesive reinforced aluminum foil tape.
    3. Flashing: Kingspan GreenGuard Butyl Flashing and / or Kingspan GreenGuard SuperStretch Butyl Flashing.
    4. Adhesives, Sealants and Primers: Adhesives, sealants and primers shall be compatible with the insulation board. Adhesives, sealants and primers referenced in the Kingspan Insulation LLC TB-011 and other products approved by the insulation manufacturer shall be acceptable.

1. EXECUTION
   1. 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.

\*\* NOTE TO SPECIFIER \*\* Kooltherm® Insulation Boards are used for non-structural thermal insulation in ceiling and floor assemblies, and door cavities in all types of construction.

* 1. INSTALLATION - GENERAL
     1. Insulation boards shall be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and the Research Report. The manufacturer's published installation instructions and the Research Report shall be strictly adhered to, and a copy of the instructions shall be available on the jobsite during installation.
     2. Insulation boards shall be separated from the interior of the building by a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4 as applicable.

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

* 1. INSTALLATION - CONCRETE SOFFIT INSULATION

\*\* NOTE TO SPECIFIER \*\* Kooltherm® K10 FM insulation. Delete if not required.

* + 1. Insulation boards shall be installed break- bonded, with joints lightly butted.
    2. The number of mechanical fasteners required to fasten soffit board shall be determined by the geographical location of the building, the local topography, the height and width of the soffit substrate, and the soffit construction.
    3. A minimum of 11 mechanical fasteners, with a minimum head diameter of 1-3/8 inches (35 mm) shall be required to secure the insulation board to the soffit. The fasteners shall be evenly distributed over the whole area of the board, and shall penetrate a minimum 1-1/2 inches (38 mm) into a solid substrate. Fasteners at board edges shall be located greater than 2 inches (51 mm) and less than 6 inches (152 mm) from edges and corners of the board and not overlap board joints.

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

* 1. INSTALLATION - ATTIC AND CRAWL SPACE INSULATION
     1. Insulation Boards installed with glass fiber tissue facing the interior of the attic or crawl space may be used for walls and ceilings of attic or crawl spaces without an ignition barrier required by IBC Section 2603.4.1.6, or IRC Sections R316.5.3 or R316.5.4, when all of the following conditions are met:
        1. Entry to the attic or crawl space shall be only to service utilities and no storage is permitted. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, and gas or electric hot water heaters and furnaces.
        2. There shall be no interconnected attic or basement areas.
        3. Air in the attic or crawl space shall not circulated to other parts of the building.
        4. Attic ventilation shall be provided when required by IBC Section 1203.2 or IRC Section R806, as applicable.
        5. Under-floor (crawl space) ventilation is provided that complies with IBC Sections 1203.3 or IRC Section R408.1, as applicable.
        6. Combustion air shall be provided in accordance with IMC (International Mechanical Code) Section 701.
        7. The insulation is limited to a maximum thickness of 4-3/4 inches (120 mm).
  2. INSTALLATION - CAVITY WALL INSULATION

\*\* NOTE TO SPECIFIER \*\* The installation information provided in this section 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 for more detailed installation information go HYPERLINK "http://www.kingspaninsulation.us/" to www.kingspaninsulation.us. Alternate installation details may be used if approved in writing by Kingspan Insulation LLC prior to installation.

* + 1. Install insulation board against the masonry wall using an adhesive or by friction fitting boards between masonry wall ties. When an adhesive is used, apply the adhesive using the amount and pattern recommended by the adhesive manufacturer.
    2. Adjacent insulation board seams shall be staggered and all board edges shall be firmly butted together.
    3. Install the exterior veneer in accordance with the manufacturer's installation instructions.

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

* 1. INSTALLATION - FRAMED WALLS - EXTERIOR INSULATING SHEATHING

\*\* NOTE TO SPECIFIER \*\* The installation information provided in this section 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 for more detailed installation information go HYPERLINK "http://www.kingspaninsulation.us/" to www.kingspaninsulation.us. Alternate installation details may be used if approved in writing by Kingspan Insulation LLC prior to installation.

* + 1. Exterior walls shall be protected by a water-resistive barrier complying with IBC Section 1404.2 or IRC Section R703.2, and by wall coverings that provide the necessary structural wind and seismic resistance between the wall framing members.
    2. Insulation boards shall not be used as a nailing base for siding materials. All fasteners shall penetrate through the insulation into the existing wall framing or structural sheathing as required by the wall covering manufacturer's instructions or the applicable Code.
    3. Begin by aligning the first board at a corner of the structure making sure that the bottom of the board overlaps the sill plate.
    4. Attach the insulation board using fasteners that are appropriate for the framing type.

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

* + 1. Seal all gaps, penetrations and repair damaged areas by using a silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, or expanding spray foam complying with AAMA 812, or either Kingspan GreenGuard Seam Tape or Kingspan GreenGuard Butyl Flashing.
    2. Install the exterior siding or cladding in accordance with the manufacturer's installation instructions. Refer to Table R703.4 of the International Residential Code (IRC) for attachment requirements for siding materials.

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

* 1. INSTALLATION - CURTAIN WALL INSULATION

\*\* NOTE TO SPECIFIER \*\* The installation information provided in this section 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 for more detailed installation information go HYPERLINK "http://www.kingspaninsulation.us/" to www.kingspaninsulation.us. Alternate installation details may be used if approved in writing by Kingspan Insulation LLC prior to installation.

* + 1. Install insulation board in curtain wall assemblies in accordance with the wall panel manufacturer's installation guidelines.
    2. Hold insulation boards in place by securing metal clips and straps or integral pockets within frames as indicated.
    3. Install the curtain wall panels in accordance with the manufacturer's installation instructions.

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

* 1. 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. 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 board to ensure exposure periods do not exceed the manufacturer's recommendations.

END OF SECTION