SECTION 07210 (07 21 00)

FOIL-FACE POLYISOCYANURATE INSULATION

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\*\* NOTE TO SPECIFIER \*\* Johns Manville; Rigid board foil faced polyisocyanurate insulation.

This section is based on the products of Johns Manville, which is located at:

717 17th Street, Box 5108

Denver, CO 80202-5108

Toll Free: (800) 654-3103

Phone: (303) 978-2000

Email: bispecservices@jm.com;.

Web: <https://www.jm.com/>

[[Click Here](https://www.arcat.com/arcatcos/cos39/arc39749.html)] for additional information.

Johns Manville is a leading manufacturer and marketer of premium-quality insulation and commercial roofing, along with glass fibers and nonwovens for commercial, industrial, and residential applications. Our history goes back to 1858, when the H.W. Johns Manufacturing Company began operations out of a tenement building in New York City.   
  
Today, our products are used in a wide variety of industries including building products, aerospace, automotive and transportation, filtration, commercial interiors, waterproofing and wind energy. A proud member of the Berkshire Hathaway family of companies, we serve customers in more than 80 countries around the globe.   
  
In business for more than 160 years, our commitment to our stakeholders is stronger than ever. We are dedicated to long-term partnerships with our customers and suppliers. We are passionate about providing a safe and equitable workplace for our 8,000 global employees. And we are committed to making a positive impact in the communities where we live and work.   
  
Our goal is to live by our core values of People, Passion, Perform and Protect.   
  
Our global headquarters is in Denver, Colorado. We also have 44 manufacturing facilities across North America and Europe. We continuously invest in our people and our infrastructure to anticipate employee, customer and community needs and provide long-lasting solutions. This approach gives us the strength we need to be the Employer of Choice and the Supplier of Choice in the markets we serve worldwide.

1. GENERAL
   1. SECTION INCLUDES

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

* + 1. Polyisocyanurate Sheathing for Exterior Applications.
    2. Polyisocyanurate Continuous Insulation.
    3. Polyisocyanurate Insulation for Exposed Interior Applications.
  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.
    2. Section 04 20 00 - Unit Masonry.
    3. Section 05 40 00 - Cold-Formed Metal Framing.
    4. Section 06 10 00 - Rough Carpentry.
    5. Section 07 60 00 - Flashing and Sheet Metal.
  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 C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block Type Thermal Insulation.
       2. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
       3. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
       4. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
       5. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
       6. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
       7. ASTM E84 - Standard Test Method for Surface Burning Characteristics.
       8. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
       9. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
       10. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
       11. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
    2. Canadian Test Methods and Specifications:
       1. CAN/ULC-S102-M88 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
       2. CAN/ULC-S704-11 - Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
       3. CCMC Listing 13104-L.
    3. CDPH/EHLB/Standard Method V1.1 (Section 01350), VOC Emissions from Building Products.
    4. International Code Council - Evaluation Service:
       1. ICC-ES AC12 - Acceptance Criteria for Foam Plastic Insulation.
       2. ICC-ES AC71 - Foam Plastic Sheathing Panels Used as Weather-Resistive Barriers.
       3. Intertek Code Compliance Research Report CCRR-0444 - Johns Manville AP Foil-Faced Sheathing.
    5. National Fire Protection Association (NFPA):
       1. NFPA 259 - Standard Test Method for Potential Heat of Building.
       2. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation.
       3. NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00.
     2. Product Data:
        1. Manufacturer's data sheets on each product to be used.
        2. Preparation instructions and recommendations.
        3. Storage and handling requirements and recommendations.
        4. Typical installation methods.

\*\* NOTE TO SPECIFIER \*\* Delete if not applicable to product type.

* + 1. Verification Samples: Two representative units 12 inch (305 mm) square insulation panel of each type, size, pattern, and color specified.
    2. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.
    3. ICC-ES Evaluation Report: Submit current CCRR-0444, Johns Manville CI Max® Foam Sheathing.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.

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

* + - 1. For polyisocyanurate Insulation for Exterior Applications: A qualified manufacturer that has ASTM C 1289, NFPA 285, and ASTM E84 listing for continuous insulation systems identical to that used for this Project.
    1. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
       1. A firm that is approved, authorized, or licensed by insulation system manufacturer to install manufacturer's product.
    2. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

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

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect’s review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
       1. The intent of a mock-up is to demonstrate quality of workmanship and visual appearance.
       2. If the mock-up is not acceptable, rebuild the mock-up until satisfactory results are achieved.
       3. Retain mock-up during construction as a standard for comparison with completed work.
       4. Do not alter or remove mock-up until work is completed or removal is authorized.
  1. PRE-INSTALLATION CONFERENCE
     1. Meeting with Owner, Architect, Installer, Manufacturer's representative, and installers that interface with or affect the installation of continuous insulation sheathing.
        1. Conduct conference at Project Site.
     2. Comply with requirements for pre-installation conferences in Division 01 Section "Project Management and Coordination".
     3. Consider methods and procedures related to continuous insulation construction and including the following:
        1. Review metal wall framing assemblies for potential interference and conflict.
        2. Review and finalize construction schedule and verify availability of materials, personnel, equipment, and facilities required to avoid delays.
        3. Review continuous insulation sheathing guidelines as indicated by Manufacturer’s installation manual.
        4. Review governing regulations and requirements for insurance and certificates if applicable.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Deliver insulation materials to Project site with original packaging unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and installing with other components.
     2. Store insulation flat on pallets in a clean, dry area above the floor or ground and standing water. Insulation to be in manufacturer's unopened packaging until ready for installation and in accordance with manufacturer's instructions and temperature recommendations. Packaging shall be intact with no exposed foam or loose flaps, labels and feet/legs must be securely affixed.
        1. If stored outdoors, keep dry by covering completely with a waterproof tarpaulin and weigh down loose boards until securely fastened.
        2. Comply with all local building and fire codes.
     3. Handle and store insulation materials in a manner to avoid damaging materials.
  3. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  4. WARRANTY
     1. Manufacturer’s standard limited warranty unless indicated otherwise.
        1. JM Rigid Foam Board 20 Year Limited Warranty:
           1. Johns Manville warrants the thermal insulation R value of its polyisocyanurate foam insulation products will not at any time after the first (1st) year after purchase, but prior to the start of the twentieth (20th) year after purchase, diminish to less than eighty percent (80%) of the published R value of the Product at the time of purchase.

Contact the manufacturer for more detailed information; terms, conditions, and limitations:

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Johns Manville which is located at: 717 17th Street, Box 5108; Denver, CO 80202-5108; ASD Toll Free Tel: (800) 654-3103; Tel: (303) 978-2000; Email: bispecservices@jm.com; Web: https://www.jm.com.

\*\* 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 the provisions of Section 01 60 00.
  1. POLYISOCYANURATE FOAM SHEATHING
     1. Basis of Design: AP Foil-Faced Rigid Polyisocyanurate Foam Sheathing, as manufactured by Johns Manville. Complies with ASTM C1289, Type 1, Class 1 or 2. Recommended for concealed uses in commercial and residential construction.
        1. Foam: Closed cell polyisocyanurate, CFC and HCFC free.
           1. Bonded on both sides to foil facers.
        2. Foil Facers: One Side: Printed reflective. One Side: Printed not reflective.
        3. Service Temperature: -100 to 250 degrees F (-73 to 122 degrees C).
     2. Standards Compliance: Third party quality control agency follow-up service requirements.
        1. Underwriters Laboratories: Complies with current UL File R10167 audit manual at manufacturing locations.
        2. Factory Mutual: Tested per ASTM E84 Test Method for Surface Burning Characteristics.
        3. Intertek: Complies with ASTM C1289, ASTM E84, NFPA 259, and NFPA 285 requirements.
        4. AATCC Test Method 127: Accepted; weathered specimens do not exhibit water leakage on the underside of any specimen tested.
        5. ASTM Test Methods and Specifications:
           1. Dimensional Stability, ASTM D 2126: 2 percent maximum linear change.

At -40 degrees F (-40 degrees C), Ambient Relative Humidity:

Maximum Linear Change: 2 percent.

At 158 degrees F (70 degrees C), 97 Percent Ambient Relative Humidity:

Maximum Linear Change: 2 percent.

At 200 degrees F (93 degrees C), Ambient Relative Humidity:

Maximum Linear Change: 4 percent.

* + - * 1. Air Permeance, ASTM E 2178, with Differential Pressure of 75 Pa (1.57 lbs per sq ft): Calculated Air Flow: 0.00013 cfm per sq ft (0.0007 L per sec per sq m).
        2. Air Leakage Rating, ASTM E2357: (0.00426 L per sec per sq m).

Specified Design Value: Qsub10 greater than 0.20 kPa.

* + - 1. ICC-ES AC71: Foam plastic sheathing panels used as weather-resistive barriers.
         1. Section 3.1 - Foam Insulation - Water Resistance (Modified): No water observed on underside of specimens after aging.
         2. Section 3.4.1.5: - Wall Assembly Water Penetration Resistance Testing: No water observed penetrating to the unexposed face of the wall assembly.
      2. Canadian Test Methods and Specifications:
         1. CAN/ULC-S704-11: Type 1, Class 1.
         2. CCMC Listing: 13104-L: Type 1, Class 1.
      3. Air Barrier Association of America (ABAA): ABAA approved material.
    1. Physical Properties:
       1. Thermal Resistance, 1 inch (25 mm) thick, ASTM C518 R Value: 6.0
       2. Compressive Strength, ASTM D1621: 16 psi (110kPa) or greater.
       3. Flexural Strength, ASTM C203: 40 psi (276 kPa) or greater.
       4. Water Absorption, ASTM C209: 0.1 percent by volume.
       5. Water Vapor Permeance, ASTM E96: 0.05 perms (3.5 ng/Pa.s.m2).
       6. Surface Burning Characteristics, ASTM E84:
          1. Flame Spread: 25 or less.
          2. Smoke Developed: 450 or less.

\*\* NOTE TO SPECIFIER \*\* Special sizes are available. Contact Manufacturer for more information.

* + 1. Board Dimensions:
       1. Width: 48 inches (1219 mm).

\*\* NOTE TO SPECIFIER \*\* Delete board lengths not required.

* + - 1. Length: 96 inches (2438 mm).
      2. Length: 108 inches (2743 mm).
      3. Length: 120 inches (3048 mm).

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraph and the thickness options not required or delete none of the following and leave as is.

* + - 1. Refer to the Drawings for required thicknesses.
      2. Nominal Thickness: 0.50 inch (12.7 mm); R-value 2.7.
      3. Nominal Thickness: 0.62 inch (15.8 mm); R-value 3.5.
      4. Nominal Thickness: 0.75 inch (19.1 mm); R-value 5.0.
      5. Nominal Thickness: 1.00 inch (25.4 mm); R-value 6.0.
      6. Nominal Thickness: 1.20 inch (30.5 mm); R-value 7.5.
      7. Nominal Thickness: 1.50 inches (38.1 mm); R-value 9.3.
      8. Nominal Thickness: 1.55 inches (39.4 mm); R-value 9.6.
      9. Nominal Thickness: 1.65 inches (41.9 mm); R-value 10.
      10. Nominal Thickness: 2.00 inches (50.8 mm); R-value 13.
      11. Nominal Thickness: 2.50 inches (63.5 mm); R-value 16.
      12. Nominal Thickness: 3.00 inches (76.2 mm); R-value 19.
      13. Nominal Thickness: 3.50 inches (88.9 mm); R-value 22.
      14. Nominal Thickness: 4.00 inches (101.6 mm); R-value 26.
      15. Nominal Thickness: 4.50 inches (114.3 mm); R-value 28.
    1. Accessories:
       1. Insulation Flashing Tape: 3M All Weather Flashing Tape 8067.
       2. Wall Penetration Sealant: Tremco Spectrem 1, or equivalent.
       3. Insulation Fasteners: JM UltraFast CI Plates and JM Ultrafast CI Phillips screws, or equivalent.
       4. Fasteners: Brick Facing Anchors, Heckman Building Products Wing Nut POS-I-TIE anchors, zinc barrel and wing nut, Hohmann and Barnard, Inc. BL-607, or equivalent.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required. AP Foil25 can be used in the same applications as our standard AP Foil product but is especially well suited for below-grade residential applications, as well as commercial applications where higher compressive strength boards are preferred for certain exterior cladding systems. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6.0 at 1 inch). Furthermore, when properly installed, AP™ Foil25 Polyiso Continuous Insulation functions as a water-resistive barrier, vapor barrier and air barrier, eliminating the need to install additional components. AP Foil25 Polyiso Continuous Insulation is produced with an EPA-compliant hydrocarbon-based1 blowing agent that has zero Ozone Depletion Potential (ODP) and virtually no Global Warming Potential (GWP); it also meets both CFC- and HCFC-free specification requirements. Polyiso is one of North America’s most widely used insulation products and has been cited by the EPA for its responsible impact on the environment. AP Foil25 Polyiso Continuous Insulation provides exceptional heat, moisture and air control to protect your building’s exterior wall assembly.

* 1. POLYISOCYANURATE CONTINUOUS INSULATION
     1. Basis of Design: AP Foil25 Polyiso Continuous Insulation as manufactured by Johns Manville is a 25 psi compressive strength board that consists of a uniform closed-cell polyisocyanurate foam core bonded on each side to a foil facer.
        1. One side has a reflective foil facer. The other side has a white non-reflective foil facer to suit your building needs.
     2. Compliances:
        1. ASTM C1289 Type 1, Class 1 or 2.
        2. CCRR-0444.
        3. Air Barrier Association of America Evaluated Air Barrier Material, Assembly and Water Resistive Barrier.
        4. International Building Code.
        5. International Residential Code.
        6. International Energy Conservation Code.
        7. ENERGY STAR.
        8. ASHRAE 90.1.
        9. California State Insulation Quality Standards.
        10. California Proposition 65.
     3. Performance Standards:
        1. AATCC Test Method 127, Water Resistance: Hydro Static Pressure Test.
        2. AC 71, Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-Resistive Barriers.
        3. ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
        4. ASTM E84, Test for Surface Burning Characteristics of Building Materials - Class A.
        5. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
        6. ASTM E1233, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential.
        7. ASTM E2178, Standard Test Method for Air Permeance of Building Materials.
        8. ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
        9. NFPA 259, Standard Test Method for Potential Heat of Building Materials.
        10. NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
     4. Thermal Performance: Aged R-value at 75 degrees F in accordance with ASTM C1289

\*\* NOTE TO SPECIFIER \*\* Delete thickness options not required. R-Value with Reflective Air Space only applies when an ideal reflective air space and horizontal heat flow conditions exist. The shiny foil side of product must face the air space. Determined in accordance with FTC 16 CFR Part 460 requirements and published ASHRAE air space R-values. Refer to the 2009 ASHRAE Handbook of Fundamentals, Chapter 25, Table 3, for details. The higher the R-value the greater insulating potential.

* + - 1. Thickness: 1.65 inches (42 mm). R-Value: 10. Rsi Value: 1.82.
         1. R-Value with Reflective 1/2, 3/4, or 1 inch (13, 19, and 25 mm) Air Space: 13.
      2. Thickness: 2.00 inches (51 mm). R-Value: 13. Rsi Value: 2.21.
         1. R-Value with Reflective 1/2, 3/4, or 1 inch (13, 19, and 25 mm) Air Space: 15.
      3. Thickness: 2.50 inches (64 mm). R-Value: 16. Rsi Value: 2.79.
         1. R-Value with Reflective 1/2 (13 mm) Air Space: 18.
         2. R-Value with Reflective 3/4 or 1 inch (19 or 25 mm) Air Space: 19.
      4. Thickness: 3.00 inches (76 mm). R-Value: 19. Rsi Value: 3.36.
         1. R-Value with Reflective 1/2, 3/4, or 1 inch (13, 19, and 25 mm) Air Space: 22.
    1. Physical Properties:
       1. Thermal Resistance per 1 inch thickness, ASTM C5181: 6.00 F x sq ft x hr / BTU.
          1. Aged R-value at 75 degrees F in accordance with ASTM 1289 (90 days at 140 degrees F).
       2. Compressive Strength per ASTM D1621: 25 psi minimum.
       3. Flexural Strength per ASTM C203L 40 psi minimum.
       4. Water Absorption percent by volume per ASTM C209: 0.1.
       5. Water Vapor Permeance perms per ASTM E96: 0.05. Class 1 vapor retarder.
       6. Air Barrier ASTM E2178: Less than 0.02 L /(s x sq m).
       7. Mold Resistance rating per ASTM D3273: 10, no defacement
       8. Sound Transmission Class for R-5 to R-13 STC per ASTM E90: 34-55
          1. Residential Exterior Wall: 1/2 inch interior gypsum, 2x4 inch studs, 16 inches on center. R-13 fiberglass cavity batts, 7/16 inch OSB sheathing, and AP Foil25 continuous insulation. Performance depends on AP Foil thickness, cladding type, and inclusion of resilient channels (optional) in the assembly.
       9. Surface Burning Characteristics
          1. Flame Spread index per ASTM E84: 25 maximum.

Foam core tested at 4 inches.

* + - * 1. Smoke Developed4 index per ASTM E84: 450 maximum
      1. Service Temperature: -100 to 250 degrees F.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required. CI Max Polyisocyanurate Foam Sheathing is recommended for interior exposed uses in commercial and residential construction. Interior wall insulation, Masonry walls (above grade and tilt up), Below-grade basement walls, Crawlspaces, Framed walls, Pre-engineered metal buildings, and Ceilings.

* 1. POLYISOCYANURATE INSULATION FOR INTERIOR EXPOSED APPLICATIONS
     1. Basis of Design: CI Max Polyisocyanurate Foam Sheathing as manufactured by Johns Manville. A foil glass-faced closed-cell rigid foam sheathing product complying with ASTM C1289, Type 1, Class 1.
        1. Foam: Closed cell polyisocyanurate, CFC and HCFC free.
           1. Bonded on both sides to glass-mat-reinforced 1.5 mil aluminum facers.

\*\* NOTE TO SPECIFIER \*\* Delete facer configuration not required.

* + - 1. Foil Facers Configuration: Unprinted silver/printed silver.
      2. Foil Facers Configuration: Unprinted white/printed silver.
      3. Service Temperature: -100 to 250 degrees F (-73 to 122 degrees C).
    1. Standards Compliances: Product is under third party quality control agency follow-up service (Intertek: ASTM-1289, ASTM E84, NFPA 285, NFPA 286) and meets the following performance standards:
       1. ASTM C1289, Type 1, Class 1.
       2. ASTM E84.
       3. CAN/ULC S102.
       4. CAN/ULC S704, Type 1, Class 1.
       5. CDPH/EHLB/Standard Method V1.1 (Section 01350).
       6. ICC-ESR-3398.
       7. International Building Code.
       8. International Residential Code.
       9. California State Insulation Quality Standards.
       10. NFPA 285.
       11. NFPA 286.
    2. Physical Properties:
       1. Dimensional Stability: Thickness.
          1. At -40 degrees F (-40 degrees C), Ambient Humidity: 0.1 percent.
          2. At 158 degrees F (70 degrees C), 97 Percent Relative Humidity: 1.6 percent.
          3. At 200 degrees F (93 degrees C), Ambient Humidity: 0.3 percent.
       2. Dimensional Stability: Width.
          1. At -40 degrees F (-40 degrees C), Ambient Humidity: -0.1 percent.
          2. At 158 degrees F (70 degrees C), 97 Percent Relative Humidity: 0.1 percent.
          3. At 200 degrees F (93 degrees C), Ambient Humidity: 0.1 percent.
       3. Dimensional Stability: Length.
          1. At -40 degrees F (-40 degrees C), Ambient Humidity: 0.0 percent.
          2. At 158 degrees F (70 degrees C), 97 Percent Relative Humidity: 0.1 percent.
          3. At 200 degrees F (93 degrees C), Ambient Humidity: 0.0 percent.
       4. Flexural Strength Breaking Load, ASTM C 203: 17 lbf (74 N).
       5. Flexural Strength Modulus of Rupture, ASTM C 203: 80 psi (553 kPa).
       6. Compressive Strength at Maximum Load (Break), ASTM C 203: 2548 psi (122 kPa).
       7. Tensile Strength at Maximum Load (Break), ASTM C 203: 2548 psi (122 kPa).
       8. Water Absorption After 2 Hour Immersion, ASTM C 209: 0.55 percent.
       9. Water Vapor Permeance, ASTM E96: 0.02 perm (1.4 ng/Pa.s.m2).
       10. Surface Burning Characteristics, ASTM E84:
           1. Flame Spread: 25 or less.
           2. Smoke Developed: 450 or less.

\*\* NOTE TO SPECIFIER \*\* Special sizes are available. Contact Manufacturer for more information.

* + 1. Board Dimensions:
       1. Width: 48 inches (1219 mm).

\*\* NOTE TO SPECIFIER \*\* Delete board lengths not required.

* + - 1. Length: 96 inches (2438 mm).
      2. Length: 108 inches (2743 mm).
      3. Length: 120 inches (3048 mm).

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraph and the thickness options not required or delete none of the following and leave as is.

* + - 1. Refer to the Drawings for required thicknesses.
      2. Nominal Thickness: 0.50 inch (12.7 mm); R-Value 2.7 (RSI-Value 0.48).
      3. Nominal Thickness: 0.77 inch (19.6 mm); R-Value 4.5 (RSI-Value 0.79).
      4. Nominal Thickness: 0.85 inch (21.6 mm); R-Value 5.0 (RSI-Value 0.88).
      5. Nominal Thickness: 1.00 inch (25.4 mm); R-Value 6.0 (RSI-Value 1.06).
      6. Nominal Thickness: 1.50 inches (38.1 mm); R-Value 9.3 (RSI-Value 1.63).
      7. Nominal Thickness: 1.55 inches (39.4 mm); R-Value 9.6 (RSI-Value 1.69).
      8. Nominal Thickness: 1.65 inches (41.9 mm); R-Value 10 (RSI-Value 1.81).
      9. Nominal Thickness: 2.00 inches (50.8 mm); R-Value 13 (RSI-Value 2.21).
      10. Nominal Thickness: 2.50 inches (63.5 mm); R-Value 16 (RSI-Value 2.79).
      11. Nominal Thickness: 3.00 inches (76.2 mm); R-Value 19 (RSI-Value 3.36).
      12. Nominal Thickness: 3.50 inches (88.9 mm); R-Value 22 (RSI-Value 3.94).
      13. Nominal Thickness: 4.00 inches (101.6 mm); R-Value 26 (RSI-Value 4.52).

1. EXECUTION
   1. EXAMINATION
      1. Do not begin installation until the substrates have been properly constructed and prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
   2. PREPARATION
      1. Clean surfaces thoroughly prior to installation.
      2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

\*\* NOTE TO SPECIFIER \*\* Delete the following Article if Interior installations are not specified.

* 1. EXPOSED INTERIOR INSTALLATION
     1. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
     2. Insulation is designed to be installed in the applications described for walls and ceilings without the addition of a fire retardant barrier.
     3. Insulation is not a structural material. Do not use as a nailing base for other building products.
     4. Comply with requirements of local building codes and authorities having jurisdiction when using insulation as an exposed product.
     5. Repair any boards damaged during installation.
        1. Patch holes less than 1 inch (25 mm) with seam tape.
        2. Patch holes greater than 1 inch (25 mm) with matching board material and seal with flashing tape having surface burning characteristics matching the specified insulation.

\*\* NOTE TO SPECIFIER \*\* Delete the following Article if exterior installations are not specified.

* 1. EXTERIOR INSTALLATION
     1. Installation Over Exterior Sheathing:
        1. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
        2. Install boards horizontally, staggering joints relative to exterior sheathing.
        3. The reflective side should face the exterior unless cladding materials are affected by radiant heat. The non-reflective side should face the exterior if the cladding materials are affected by radiant heat.
           1. Boards may be installed vertically if it results in fewer seams.
        4. Use maximum board lengths to minimize joints. Locate joints square to and centered over framing, providing additional blocking, as necessary.
        5. Stagger each course by at least one stud to eliminate continuous vertical seams.
        6. Butt edges tightly, carefully fitting around openings and penetrations.
        7. Fasten insulation boards to the exterior face of the stud framing using sheathing manufacturer’s recommended fasteners.
           1. Space fasteners 16 inches (406 mm) on center at the board perimeter, or consistent with framing spacing but not greater than 24 inches (610 mm) on center.
           2. Space fasteners 24 inches (610 mm) on center in the field, or consistent with framing spacing.
           3. One fastener and plate can bridge between a maximum of two adjoining board edges.
           4. Drive fasteners so the stress plate is flush with the board surface. Do not countersink.
           5. Install exterior cladding ties as applicable.
        8. To create an air and water resistive barrier, tape all seams, edges, end joints, and thru-wall penetrations with manufacturer’s recommended flashing tape.
           1. Install flashing shingle-style with a minimum 4 inch (102 mm) overlap, following the tape manufacturer’s application instructions.
           2. Seal fastener penetrations by applying a 4 inch (102 mm) square of tape over each plate, smoothing edges to create an air tight seal between the tape and the insulation board.
           3. Create continuous air/water barrier at roof and foundation wall interface with peel-and-stick membrane, or other approved barrier, following membrane manufacturer’s application instructions.
        9. Seal penetrations and panel defects with manufacturer’s recommended sealant or tape.
        10. Repair boards damaged during installation.
            1. Patch holes less than 1 inch (25 mm) with flashing tape.
            2. Patch holes greater than 1 inch (25 mm) with matching board material and seal with flashing tape.
        11. As applicable, the wall is now ready for stud cavity insulation and exterior veneer.
     2. Installation Direct to Exterior Metal Studs:
        1. Install in strict accordance with manufacturer’s recommendations and written instructions, including the following:
           1. Install after structural steel and exterior framing and bracing are complete.
           2. Install boards horizontally using maximum board length to minimize joints.
           3. The reflective side should face the exterior unless cladding materials are affected by radiant heat. The non-reflective side should face the interior unless the cladding materials are affected by radiant heat.
           4. Locate joints parallel to framing flange.
           5. Stagger each course at least one stud space to minimize continuous vertical seams.
           6. Boards may be installed vertically if it results in fewer seams.
           7. Fasten insulation boards to the exterior face of the stud framing using sheathing manufacturer’s recommended fasteners.

Space fasteners 16 inches (406 mm) on center at the board perimeter, and 16 inches (406 mm) on center in the field of the board.

One fastener/plate can bridge between a maximum of two adjoining board edges.

Drive fasteners so the stress plate is tight and flush with the board surface, but do not countersink.

Install exterior cladding ties as applicable.

* + - 1. To create an air/water-resistive barrier, tape all seams, edges, end joints, and thru-wall penetrations with sheathing manufacturer’s recommended flashing tape.
         1. Install flashing shingle-style with a minimum 4 inch (102 mm) overlap and follow the tape manufacturer’s application instructions.
         2. Seal fastener penetrations by applying a 4 x 4 inch (102 x 102 mm) piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board.
         3. Create continuous air/water barrier at roof and foundation wall interface using peel-and-stick membrane, or other approved barrier, following manufacturer’s application instructions.
      2. Seal penetrations and panel defects with sheathing manufacturer’s recommended sealant.
      3. Repair boards damaged during installation.
         1. Patch holes less than 1 inch (25 mm) across with flashing tape.
         2. Patch holes greater than 1 inch (25 mm) with matching board material and then seal with flashing tape.
      4. As applicable, the wall is now ready for stud cavity insulation and exterior veneer.
  1. FIELD QUALITY CONTROL
     1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
  2. CLEANING AND PROTECTION
     1. Protect materials from damage during installation and subsequent construction.
     2. Clean products in accordance with the manufacturer’s recommendations.
     3. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION