
MANUFACTURER'S GUIDE SPECIFICATIONS

SECTION 07 27 23
RIGID FOAM BOARD INSULATING
AIR BARRIER



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1 GENERAL

1.01 SECTION INCLUDES

- A. Foil-faced, polyisocyanurate foam board insulation for use as an air, vapor and thermal barrier in above-grade wall assemblies.
- B. Materials and installation to provide “continuous insulation” and “continuous air barrier” as required in [Section 01 41 13 – Codes, Section 01 83 16 – Exterior Enclosure Performance Requirements] including adhering or fastening insulation in place, sealing joints and penetrations through insulation, providing an air and water-tight seal over moving joints and sealing insulation air barrier to adjacent systems such as the roof, foundation and openings.

1.02 RELATED SECTIONS

- A. Section 01 41 13 – Codes [Continuous insulation, Continuous air barrier, fire tests: ASTM E 119, NFPA 285, NFPA 286]
- B. Section 01 83 16 – Exterior Enclosure Performance Requirements [continuous insulation, continuous air barrier, hygro-thermal performance, assembly fire tests – ASTM E 119, NFPA 285, NFPA 286]
- C. Section 01 91 19 – Facility Shell Commissioning [address continuity of insulation and air barrier throughout the building enclosure, alignment of insulation with fenestration thermal breaks, assure that insulation does not interfere with wall weep/drainage systems and address any other issues involving proper incorporation of the insulation into the building enclosure]
- D. Section 03 30 00 - Cast-In-Place Concrete [Insulation installed on interior or exterior side of concrete wall, ties and anchors installed through insulation]
- E. Section 03 40 00 – Pre-Cast Concrete [Insulation installed on interior or exterior side of concrete wall, ties and anchors installed through insulation]
- F. Section 04 20 00 - Unit Masonry [Brick veneer installed over insulation. Insulation installed on interior or exterior side of concrete masonry unit wall. Attach brick veneer anchors to structure or solid substrate – not directly to insulation. Type of brick veneer anchor determines if it is installed before or after insulation. Apply a strip of insulation joint tape at locations where veneer anchors will be driven through

insulation. Through-wall flashings shall be installed to solid wall, spanning insulation, cavity and brick veneer. Insulation shall not block drainage and weeps]

- G. Section 04 40 00 – Stone Assemblies Stone veneer installed over insulation. [Attach stone veneer anchors to structure or solid substrate – not directly to insulation. Apply a strip of insulation joint tape at locations where veneer anchors will be driven through insulation. Through-wall flashings shall be installed to solid wall, spanning insulation, cavity and stone veneer. Insulation shall not block drainage and weeps]
- H. Section 05 40 00 – Cold-Formed Metal Framing [Product installed over metal framing on interior or exterior side of wall assembly]
- I. Section 06 11 00 – Wood Framing [Insulation installed over wood framing on interior or exterior side of wall assembly]
- J. Section 06 16 00 – Wood Sheathing [Insulation installed over exterior wood sheathing in wall assembly]
- K. Section 07 25 00 – Weather Barriers [Insulation installed over weather barriers, or weather barriers installed over insulation]
- L. Section 07 26 00 – Vapor Barriers [Insulation installed over vapor barrier membrane, or vapor barrier membrane installed over insulation. CAUTION: insulation is a vapor barrier – do not close the wall cavity with a double vapor barrier]
- M. Section 07 42 00 – Wall Panels [Installed over insulation. Attach wall panels to structure or solid substrate – not directly to insulation. Apply a strip of insulation joint tape at locations where panel mounting hardware will be driven through insulation.]
- N. Section 07 46 00 – Siding [Installed over insulation. Attach siding to structure or solid substrate – not directly to insulation. Apply a strip of insulation joint tape at locations where furring strips or similar hardware will be driven through insulation.]
- O. Section 07 60 00 – Flashings and Sheet Metal [Installed through, over or at termination of insulation. Interface of flashing and insulation with foam sealant or other approved sealant]
- P. Division 08 – Openings. [Provide an air-tight seal of fenestration to insulation air barrier]
- Q. Section 09 22 00 – Supports for Plaster and Gypsum board [Installed over insulation. Attach supports to structure or solid substrate – not directly to insulation. Apply a strip of insulation joint tape at locations where support hardware will be driven through insulation.]

- R. Section 09 24 00 – Portland Cement Plastering [Installed over insulation. Attach plastering with lath or supports anchored to structure or solid substrate – not directly to insulation. Apply a strip of insulation joint tape at locations where support hardware will be driven through insulation.]
- S. Section 09 29 00 – Gypsum Board [Insulation installed over exterior gypsum sheathing. Interior gypsum sheathing anchored to framing or solid substrate, Interior gypsum installed over insulation]
- T. Facility Services Subgroup – Divisions 20 through 28. [All trades which will be penetrating the insulation air barrier with mechanical, electrical, telecommunications or other service shall provide an air and water –tight seal to the insulation. This language shall be included in the respective Section]
- U. Section [_____] Other

1.03 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 “Energy Standard for Buildings Except Low-Rise Residential Buildings”
- B. ASTM C 209 Standard Test Methods for Cellulosic Fiber Insulating Board
- C. ASTM C 518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- D. ASTM C 1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- E. ASTM D 882 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Ten
- F. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive
- G. ASTM D 4073 Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes
- H. ASTM D 2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
- I. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- J. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials

- K. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Materials
- L. ASTM E 154 Standard Test Methods for Water Vapor Retarders used in Contact with Earth under Concrete Slabs, on Walls or as Ground Cover
- M. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- N. ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- O. ASTM G 53 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials
- P. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- Q. NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

1.04 PERFORMANCE REQUIREMENTS

- A. Material Properties - Insulation
 - 1. Shall consist of a closed cell polyisocyanurate foam core with tri-laminate aluminum foil /kraft paper/ aluminum foil facing, both sides
 - 2. Shall meet ASTM C 1289 Type I, Class 1 [Grade 2 (20 psi) or Grade 3 (25 psi)]
 - 3. Shall have an initial thermal resistance at 75 degrees F of $6.7 \text{ }^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h}/\text{Btu}$ per inch (R-6.7/ inch), ASTM C 518
 - 4. Minimum thickness and R-Value [Select one: 1 inch R-6.7, 1.5 inch R-10.5, 2.0 inch R-14.4, 2.5 inch R-17.8, 3.0 inch R-21.2, 3.5 inch R-24.6]
 - 5. 3.5 inch thick foam core shall have a flame spread index of 75 or less and a smoke generation index of 450 or less, ASTM E 84
 - 6. Water vapor permeance of 1 inch thick board: Maximum 0.1 Perm, ASTM E 96 A
 - 7. Dimensional stability: Maximum 2% change after 7 days, ASTM D 2126
 - 8. Water absorption: Maximum 0.05% volume, ASTM C 209
- B. Material Properties – Insulation Joint Tape
 - 1. Minimum thickness: 0.017 inch (17 mils)
 - 2. Facer: aluminum foil, minimum 0.002 inch (2 mils) thickness
 - 3. Adhesive: Non-asphalt, modified butyl minimum 0.015 inch (15 mils)

thickness

4. Service temperature: Minus 20 degrees F to 180 degrees F
5. Application temperature: 40 degrees F and higher without contact adhesive, 25 degrees and higher with contact adhesive
6. Insulation joint tape and contact adhesive shall be provided by same manufacturer
7. Tensile strength: 16 lb/in minimum, ASTM D 882
8. Flame spread index 25 or less, smoke generation Index: 450 or less, ASTM E 84
9. Water vapor permeance: Maximum 0.1 Perm, ASTM E 96 B
10. UV resistance: Unaffected after 2,000 h in QUV, ASTM G 53

C. Material Properties – Insulation Adhesive

1. Shall consist of solvent-based synthetic rubber
2. Percent solids: 58% minimum, ASTM
3. Low-temp flexibility: No cracking after 180 degree bend over 1” mandrel at minus 25 degrees F, ASTM D 1970
4. Tensile elongation: 1,000% minimum, ASTM D 412
5. Peel adhesion on aluminum substrate: 25 lb/in minimum, ASTM D 903
6. Volatile Organic Content (VOC): 250 g/L, maximum

D. Material Properties – Self-Adhered Flashing

1. Product shall consist of nominal 0.040 inch (40 mils) thickness composite membrane consisting of foil-faced glass laminated with fire retardant pressure-sensitive butyl adhesive.
2. Tensile Strength 65 lb_f/in or greater, ASTM D 882
3. Puncture resistance 70 lb_f or greater, ASTM E 154
4. Tear initiation and propagation not less than 60 lb_f/in, ASTM D 4073
5. No cracking at minus 20 degrees F, 180 degree bend over 1 inch mandrel, ASTM D 1970
6. Lap adhesion not less than 10 lb_f/in, ASTM D 1876
7. Water vapor permeance 0.1 perm or less, ASTM E 96 B
8. Flame spread index 25 or less, smoke generation index 450 or less, ASTM E 84

E. Material Properties –Transition Membrane

1. Shall consist of a 90 mil composite membrane composed of 60 mils uncured EPDM laminated with 30 mils of synthetic rubber pressure-sensitive adhesive
2. Water vapor permeance 0.1 or less, ASTM E 96 B
3. Service Temperature minus 49 degrees F to 240 degrees F

F. Material Properties – Foam Sealant

1. Shall consist of one-component, low expansion polyurethane foam.
2. Flame Spread Index 25 or less, Smoke Development Index 450 or less, ASTM E 84

3. Cellular structure: 60% closed cell
 4. Skin formation time: 10 minutes or less
 5. Waterproof after full cure
- G. Material Properties – Insulation Fasteners
1. Shall consist of a metal screw with corrosion resistant coating, or a plastic screw for concrete and masonry. Screw shall be fitted with a low-profile plastic washer, minimum 1.75 inch diameter, designed to grip and hold insulation board.
 2. Fastening insulation to steel studs: Use self-tapping sheet metal thread screw. Screw shall penetrate steel stud minimum 4 threads.
 3. Fastening insulation to concrete or masonry: Use metal screw or plastic screw tapped into pilot hole. Screw shall penetrate into concrete or masonry substrate 1 ½- inch minimum.
 4. Fastening insulation to wood. Use wood screw, penetrate into wood substrate 1-inch minimum

1.05 SUBMITTALS

- A. Manufacturer's literature, including physical properties, installation instructions and detail drawings.
- B. [Retain for Projects of Type I-IV multi-story construction: List of wall assemblies incorporating the insulation which meet NFPA 285]
- C. Manufacturer's literature for insulation accessories including self-adhered flashing, insulation joint tape, transition membrane, insulation adhesive, insulation fasteners and foam sealant.
- D. Confirmation in writing of compatibility of insulation with adhesives, tapes, membranes, coatings and other chemicals which are expected to come into contact with the insulation on the Project.
- E. Sample of insulation product, minimum 4 inch X 4 inch size
- F. Samples or self-adhered flashing and transition membrane minimum 2 inch X 3 inch size.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.
- B. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs)

- C. Comply with the provisions of the Owner's building envelope commissioning program in accordance with [Section 01 91 15]
- D. Pre-Installation Meeting: Convene [one] [_____] week prior to commencing Work of this Section, in accordance with [Section 01 31 19 - Project Meetings].
- E. Field-Constructed Mock-Ups: Prior to installation on Project, apply insulation and accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application. [NOTE TO SPECIFIER: incorporate sub paragraph 1 or 2 into Paragraph E]
 - 1. Apply in field-constructed mockups of assemblies as specified in [Section 01 43 39 – Mockups]
 - 2. Construct typical exterior wall panel, 8 feet long by 8 feet wide, incorporating back-up wall, water resistive barrier, insulation, cladding, window and doorframe and sill and flashing, [building corner condition,] [junction with roof system] [foundation wall] [and] [typical penetrations and gaps]; illustrating interface of materials and seals
- F. Test mock-up for air leakage in accordance with ASTM E 783. Measured air leakage rate shall not exceed $0.2 \text{ L/s}\cdot\text{m}^2$ at 75 Pa (0.04 CFM/ft^2 at 1.57 PSF)
- G. Test mock-up for water leakage in accordance with ASTM E1105. There shall be no observed water leakage to the interior after 15 minutes at -6.24 PSF.
- H. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed insulation until it has been inspected, tested and approved.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect insulation from physical damage.
- B. Store insulation pallets indoors, or store insulation pallets outdoors elevated above ground 4 inches minimum and covered with breathable UV-resistant tarpaulin.
- C. Store insulation adhesive, insulation tape, self-adhered flashing, transition membrane and foam sealant in an area maintained between 50 and 90 degrees F and protected from precipitation and direct sunlight.
- D. Handle insulation boards carefully, so corners are not damaged or broken off.

1.08 WASTE MANAGEMENT AND DISPOSAL

- A. Separate and recycle waste materials in accordance with [Section 01 74 19 – Construction Waste Management and Disposal], and with the Waste Reduction

Work Plan.

- B. Place materials defined as hazardous or toxic waste in designated containers
- C. Ensure emptied containers are stored safely for disposal away from children

1.09 PROJECT CONDITIONS

- A. Install insulation adhesive, insulation tape, self-adhered flashing, transition membrane and foam sealant within approved ambient and substrate temperature range and conditions stated in manufacturer's literature.
- B. Do not apply insulation or accessories over incompatible materials
- C. Observe safety and environmental measures indicated in manufacturer's MSDS, and mandated by federal, state and local regulations.

2 PRODUCTS

2.01 PRODUCT:

- A. R2+ SILVER foil-faced polyiso insulation, as manufactured by Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website <http://www.carlisle-ccw.com>
- B. Other equivalent product

2.02 ACCESSORIES:

- A. Insulation Adhesive:
 - 1. LM 800 XL by Carlisle Coatings & Waterproofing Incorporated
 - 2. Others as approved by insulation manufacturer
- B. Insulation Tape
 - 1. CCW Foil-Grip 1402 by Carlisle Coatings & Waterproofing Incorporated
 - 2. Others as approved by insulation manufacturer
- C. Self-Adhered Flashing
 - 1. FIRE-RESIST 705 FR by Carlisle Coatings & Waterproofing Incorporated
 - 2. Others as approved by insulation manufacturer
- D. Transition Membrane
 - 1. SURE-SEAL Pressure-Sensitive Un-Cured Elastoform by Carlisle Coatings & Waterproofing Incorporated
 - 2. Others as approved by insulation manufacturer

- E. Foam Sealant
 - 1. FireBlock Gun Foam by TVM Building Products
 - 2. Fireblock Foam Sealant by FOMO
 - 3. Others as approved by insulation manufacturer

- F. Insulation Fasteners
 - 1. Thermal-Grip™ CI washers fitted with Grip-Deck™ Screws by Rodenhouse, Inc.
 - 2. Plasti-Grip PMF™ fastener for concrete/masonry substrates by Rodenhouse, Inc.
 - 3. Ci-Lock™ by Wind-Lock
 - 4. Others as approved by insulation manufacturer

3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions affecting installation of the insulation product 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.

- B. Concrete wall surfaces shall be of sound condition and shall have honeycomb filled and sharp protrusions knocked off or ground flush

- C. Concrete masonry unit wall surfaces shall be free of mortar droppings. Mortar joints shall be completely filled and tooled or struck flush.

- D. Damaged or improperly-fastened exterior sheathing shall be remedied to comply with building code and sheathing manufacturer's requirements.

- E. Wood or metal wall studs shall be of sound condition, properly spaced, plumb and laterally-braced according to structure and code requirements.

- F. Water resistive barrier membrane over wall surfaces shall be firmly attached and in good condition.

3.02 INSTALLATION

- A. Attach insulation board to fully-supported wall surface with one of the following methods:
 - 1. Bond in place with insulation adhesive, applied to back of insulation in minimum 3 inch diameter X 0.375 inch thickness dabs of insulation adhesive, applied 16 inches on center.

2. Fasten in place with insulation fasteners, 16 inches on center in the field and 12 inches on center at terminations and window openings
- B. Attach insulation to open wood or metal studs with insulation fasteners, spaced 16 inches on center along studs and 12" on center at terminations and window openings.
 - C. Abut neighboring insulation boards tightly together. Offset insulation board joints in neighboring rows 6 inches minimum.
 - D. Dry fit insulation board and cut to size and shape around obstructions to allow snug fit onto wall surface or studs
 - E. Seal joints between insulation boards with one of the following methods:
 1. Cover joints up to 0.125 inch across with insulation joint tape, minimum 4 inch width centered over joint
 2. Fill joints up to 0.25 inch across with insulation adhesive struck flush
 3. Fill joints up to 0.50 inch across with foam sealant
 4. Fill gaps exceeding 0.50 inch across with pieces of insulation secured in place with foam sealant, insulation adhesive or insulation joint tape
 - F. Cover insulation fasteners with insulation joint tape, with tape extending minimum 0.75 inch past edge of washer
 - G. Cover inside corners and outside corners with minimum 9 inch width self-adhered flashing to provide 3 inch bearing onto either side of joint
 - H. Apply self-adhered flashing at wall transitions and terminations, minimum 9 inch width to provide 3 inch bearing onto either side of joint.
 - I. Wrap window openings with self-adhered flashing. Self-adhered flashing shall bear onto insulation surface 3 inches minimum and shall return into opening according to Project window details.
 - J. Cover expansion joints with transition membrane over expansion bulb
 - K. Apply transition membrane to bridge gap from wall to curtain wall

3.03 REPAIR AND PROTECTION

- A. Protect insulation from mechanical damage and exposure to open flame during installation and exposure.
- B. Repair damage to insulation as recommended by manufacturer before covering

- C. Cover insulation with cladding as soon as schedule permits. Do not leave insulation exposed longer than 60 days.

END OF SECTION