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DIVISION: 07 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Thermal Insulation
Section: 07 25 00 – Water resistive Barriers/Weather Barriers
Section 02 27 00 – Air Barriers

REPORT HOLDER:
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REPORT SUBJECT:
AP™ Foil-Faced Continuous Insulation and CI MAX® Polyisocyanurate Insulation

1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2021 and 2018 *International Building Code*® (IBC)
- 2021 and 2018 *International Residential Code*® (IRC)
- 2021 and 2018 *International Energy Conservation Code*® (IECC)
- 2022 *California Building Code* (CBC) (See Section 9)
- 2022 *California Green Building Standard Code* (See Section 9)
- Seal and Insulate with ENERGY STAR (See supplement)

NOTE: This report references the most recent edition of the Codes cited. Section numbers in earlier editions may differ.

1.2 The AP™ Foil-Faced Continuous Insulation and CI MAX® polyisocyanurate insulation products have been evaluated for the following properties (see Table 1):

- Physical properties
- Surface burning characteristics
- Thermal resistance
- Water vapor permeance
- Air permeance

1.3 The AP™ Foil-Faced Continuous Insulation and CI MAX® polyisocyanurate insulation products have been evaluated for the following uses (see also Table 1):

- Nonstructural insulation within or on interior or exterior walls and ceiling assemblies; at the perimeter of concrete slabs on grade; on the interior side of basement foundation walls; and under slabs on grade
- Use in Types I, II, III, IV and V construction
- Alternative thermal barrier (CI MAX®)
- Alternative water-resistive barrier (AP™ Foil)
- Air barrier (AP™ Foil)

2.0 STATEMENT OF COMPLIANCE

The AP™ Foil-Faced Continuous Insulation and CI MAX® polyisocyanurate insulation products comply with the Codes listed in Section 1.1, for the properties stated in Section 1.2, and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.

3.0 DESCRIPTION

3.1 AP™ Foil-Faced Continuous Insulation: Referred to in the remainder of this report as AP™ Foil, the insulation has a nominal 1.7 pcf polyisocyanurate foam plastic core with a kraft paper / aluminum foil facing on both sides. The insulation boards have square edges and are supplied in thicknesses between 1/2 and 4.5 inches, in various lengths and widths.

3.2 CI MAX®: CI MAX® has a nominal 1.7 pcf polyisocyanurate foam plastic core with a glass-mat /aluminum foil facer on one side and a kraft paper / aluminum foil facer on the other. The insulation boards have square edges and are supplied in thicknesses between 1/2 and 4 inches, in various lengths and widths.

4.0 PERFORMANCE CHARACTERISTICS

4.1 Physical Properties: AP Foil™ and CI MAX® insulation comply with ASTM C1289 as Type I, Class 1 and Class 2.



4.2 Surface Burning Characteristics: The insulation products have a flame spread index of 25 or less and a smoke developed index of 450 or less, when tested in accordance with ASTM E84 (UL 723).

4.3 Thermal Resistance: The insulation boards have a thermal resistance (R-value) shown in Table 2.

4.4 Air Permeance: At a minimum thickness of 1 inch, the insulation boards have an air permeance not greater than 0.02 L/s.m², when tested in accordance with ASTM E2178.

4.5 Water Vapor Permeance: At a minimum thickness of 1 inch, the insulation boards have a water-vapor permeance not greater than 0.1 perm, when tested in accordance with ASTM E96 (desiccant method).

5.0 INSTALLATION

5.1 General: The insulation boards must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

5.2 AP™ Foil:

5.2.1 General: AP™ Foil may be used as nonstructural insulation on walls and ceilings to a maximum thickness of 4.5 inches. The maximum thickness may be achieved with a single layer or multiple layers stacked to the maximum thickness. See Table 3 for fastener spacing.

AP™ Foil insulation boards installed on the interior side of exterior walls or on interior walls or ceilings must be covered with a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, except as permitted for attics and crawl spaces in accordance with IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4.

5.2.2 Water Resistive Barrier: AP™ Foil may be used as an alternative to the water-resistive barrier prescribed in IBC Section 1403.2 and IRC Section R703.2.

The AP™ Foil boards may be oriented either vertically or horizontally and installed directly over wood or steel framing spaced a maximum of 16 inches on center. The insulation boards must be attached to sheathing or framing

with capped nails or screws, or with framing staples, spaced a maximum of 16 inches.

Seams, fasteners, and joints must be covered with 4-inch-wide 3M 8777 All Weather Flashing Tape centered over the seam, fastener, or joint. Penetrations must be sealed on the exterior side with 3M 8777 Flashing Tape or a sealant complying with ASTM C920 Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O. See Figure 4.

For window installation, refer to Figure 3. Sill flashing is installed first, followed by the window, then jam flashing, then head flashing. The window must be installed in accordance with the window manufacturer's instructions.

The AP Foil insulation boards must be covered with an approved exterior wall covering within the time set forth in the report holder's published installation instructions.

5.2.3 Vapor Retarder: At a minimum thickness of 1 inch, AP™ Foil demonstrates a vapor permeance of less than 0.1 perm when tested in accordance with ASTM E96 (desiccant method) and qualifies as a Class I vapor retarder.

5.2.4 Air Barrier: AP™ Foil is considered an air barrier material in conformance with IECC Section C402.5.1.3 based on testing in accordance with ASTM E2178.

AP™ Foil may be used as an air barrier assembly in conformance with IECC Section C402.5.1.4 based on testing in accordance with ASTM E2357. Seams, joints, fasteners, and penetrations must be treated as described for water-resistive barriers in Section 5.2.2.

5.2.5 Exterior Walls of Types I, II, III and IV Construction: AP™ Foil insulation boards may be used on exterior walls of buildings required to be of Types I, II, III and IV construction. The assembly must comply with IBC Section 2603.5 and as described in Table 4 and Intertek Design Listings [JMC/FBI 30-01](#), [JMC/FBI 30-02](#), [JMC/FBI 30-03](#) and [JMC/FBI 30-04](#). The potential heat of the AP™ Foil boards is 1677 Btu/ft² per inch of thickness when tested in accordance with NFPA 259.

Assemblies described in Table 4 are based on data submitted to Intertek. Other constructions may be considered when justified to the satisfaction of the building official.





5.3 CI MAX®:

5.3.1 General: CI MAX® may be used as nonstructural insulation on walls and ceilings to a maximum thickness of 4 inches. See Table 3 for fasteners spacing.

CI MAX® insulation boards must be covered with a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, except as permitted in Sections 5.3.4 and 5.3.5.

5.3.2 Water-resistive Barrier: When used on exterior walls, CI MAX® must be used in conjunction with a water-resistive barrier complying with IBC Section 1403.2 or IRC Section R703.2.

5.3.3 Vapor Retarder: At a minimum thickness of 1 inch, CI MAX® demonstrates a vapor permeance of less than 0.1 perm when tested in accordance with ASTM E96 (desiccant method) and qualifies as a Class I vapor retarder.

5.3.4 Thermal Barriers: CI MAX® insulation boards, at a maximum thickness of 4 inches, may be installed without the thermal barrier prescribed in IBC Section 2603.4 and IRC Section R316.4. Installation without the thermal barrier may be installed to the wall or ceilings, but not both. The insulation board must be installed with the non-printed facer to the interior of the building. A thermal barrier is required for thicknesses greater than 4 inches.

5.3.5 Attics and Crawl Spaces: CI MAX® insulation boards, at a maximum thickness of 4 inches, may be installed in attics and crawl spaces without the prescriptive ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4. Installation without the ignition barrier may be to the walls or ceilings, but not both. An ignition barrier is required for thicknesses greater than 4 inches and must be consistent with the requirements for the type of construction. Attic and under-floor (crawl space) ventilation shall be in accordance with the applicable Code.

5.3.6 Exterior Walls of Types I, II, III and IV Construction: CI MAX® insulation boards may be used on exterior walls of buildings required to be of Types I, II, III and IV construction when the assembly complies with IBC Section 2603.5 and is as described in Table 4 and Intertek Design Listings [JMC/FBI 30-01](#), [JMC/FBI 30-02](#), [JMC/FBI 30-03](#) and [JMC/FBI 30-04](#). The potential heat of the CI MAX® boards is 1677 Btu/ft² per inch of thickness when tested in accordance with NFPA 259.

Assemblies described in Table 4 are based on data submitted to Intertek. Other constructions may be considered when justified to the satisfaction of the building official.

6.0 CONDITIONS OF USE

6.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

6.2 Use of the insulation boards to resist structural loads is outside the scope of this report.

6.3 The insulation boards shall not be used as a nailing base.

6.4 Jobsite certification and labeling must comply with IRC Sections N1101.10.1 and IECC Sections C303.1.1 and R303.1.1.

6.5 Use of the insulation boards in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603.8 or IRC Section R318.4.

6.6 The insulation boards must be covered with a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, except as described in Sections 5.3.4 and 5.3.5 of this report.

6.7 Exterior wall coverings must be structurally adequate to resist applicable loads and must be installed in accordance with the Code. Walls must be braced in accordance with the Code.

6.8 The insulation boards are manufactured under a quality control program with inspections by Intertek Testing Services NA, Inc.

7.0 SUPPORTING EVIDENCE

7.1 Reports of tests in accordance with ASTM C1289-18, ASTM E84-18b, ASTM C518-21, ASTM E96, ASTM E2178, ASTM E2357, NFPA 259, NFPA 285, and NFPA 286.





7.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12) dated June 2015, editorially revised December 2020.

7.3 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels used as Weather-resistive Barriers (AC71), dated February 2003.

7.4 Jensen Hughes Evaluation Letter Re. Alternate Exterior Wall Constructions Incorporating Foam Sheathing Complying with NFPA 285, Project No 1AJ00309.000, dated April 29, 2021.

7.5 Priest & Associates Engineering Evaluation 11207, Revision 2 dated February 27, 2023.

7.6 Intertek Listing Reports "AP Foil Faced Continuous Insulation" and "CI MAX Polyisocyanurate Insulation", on the [Intertek Directory of Building Products](#).

8.0 IDENTIFICATION

AP™ Foil and CI MAX® are identified with the manufacturer's name (Johns Manville), the product name, the flame-spread and smoke developed indices, the Intertek Mark as shown below, the Intertek Control Number and the Code Compliance Research Report number (CCRR-0444).



9.0 CALIFORNIA BUILDING CODE

9.1 2022 California Building Code: When installed in accordance with this report, the insulation boards comply with the 2022 *California Building Code*, *California Residential Code* and *California Energy Code*, excluding CBC Chapter 7A and CRC Section R337.

9.2 2022 California Green Building Standard Code, Title 24 Part 11: When installed as described in Section 5.2.2 or 5.3.2 of this report for use as a water-resistive barrier, or Section 5.2.4 for use as an air barrier, the insulation boards conform with the provisions of CALGreen Sections 5.407.1 and 5.505.1.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

10.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

10.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

10.3 Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

This Code Compliance Research Report ("Report") is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Report. Only the Client is authorized to permit copying or distribution of this Report and then only in its entirety, and the Client shall not use the Report in a misleading manner. Client further agrees and understands that reliance upon the Report is limited to the representations made therein. The Report is not an endorsement or recommendation for use of the subject and/or product described herein. This Report is not the Intertek Listing Report covering the subject product and utilized for Intertek Certification and this Report does not represent authorization for the use of any Intertek certification marks. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek.



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TABLE 1A – PROPERTIES EVALUATED – INTERNATIONAL CODES

PROPERTY	2021 IBC SECTION	2021 IRC SECTION	2021 IECC SECTION
Physical properties	1508	R906	Not applicable
Surface burning characteristics	2603.3	R316.3	Not applicable
Thermal resistance	1301	N1102	C402, R402
Water-resistive barrier	1403.2	R703.2	Not applicable
Vapor retarder	202, 1404.3	R202, R702.7	R402.1.1
Air barrier	1301	N1102.4	C402.5.1, R402.4
Thermal / ignition barriers	2603.4	R316.4	Not applicable
Types I – IV construction	2603.5	Not applicable	Not applicable

Section numbers in earlier versions of the Codes may differ.

TABLE 2B – PROPERTIES EVALUATED – CALIFORNIA CODES

PROPERTY	2022 CBC SECTION	2022 CRC SECTION	2022 CEC SECTION
Physical properties	1508	R906	Not applicable
Surface burning characteristics	2603.3	R316.3	110.8 (c)
Thermal resistance	Refer to CEC	Refer to CEC	110.8 (a)
Water-resistive barrier	1403.2	R703.2	Not applicable
Vapor retarder	202, 1404.3	R202, R702.7	150.0 (g) 2
Air barrier	Refer to CEC	Refer to CEC	140.3 (a) 9
Thermal / ignition barriers	2603.4	R316.4	Not applicable
Types I – IV construction	2603.5	Not applicable	Not applicable





TABLE 2 – THERMAL RESISTANCE

Thickness (in.)	R-Value [$^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{hr}/\text{Btu}$ at 75 $^{\circ}\text{F}$ Mean Temperature]
1	6.0
1.2	7.5
1.65	10
2	13
4	26
4.5	28

TABLE 3 – FASTENER SPACING

Product	Installation Location	Framing Type	Maximum Fastener Spacing (inches) ¹	
			Perimeter	Field
AP™ Foil	Interior-facing Wall	Wood	24	48
	Exterior-facing Wall	Wood Metal	16, 24	16, 24
		Masonry	24	24
	Below-Grade	Masonry	24	24
	Attics/Roof	Wood	16, 24	16, 24
CI Max®	Interior-facing Wall	Wood Metal Masonry	24	48

¹Fasteners must be spaced a maximum of 16 inches on-center around the perimeter and in the field when AP™ Foil is installed directly to wood or metal framing or when used as an air and/or water resistive barrier. Fasteners may be spaced a maximum of 24 inches on-center around the AP™ Foil perimeter and in the field when installed onto masonry walls or over sheathing.



TABLE 4 – NFPA 285 COMPLYING WALL ASSEMBLIES

<p>Base wall system – Use either 1, 2, 3, or 4</p> <p>Do not use Item 4 with Exterior Veneer System 11</p>	<ol style="list-style-type: none"> 1. Concrete wall 2. Concrete Masonry wall 3. 1 layer of 5/8-inch-thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8-inch-deep minimum 20-gauge-thick steel studs spaced a maximum of 24 inches on-center. Lateral bracing installed minimum every 4 ft. vertically or as required. Minimum 4 pcf mineral wool shall be friction fit between steel wall studs at each floorline. Height of mineral wool insulation shall be the same as the floor slab thickness. 4. For walls that are not required to be fire-resistance rated, 1 layer of 5/8-inch-thick Type X gypsum wallboard installed on the interior side of minimum 2x4 fire-retardant-treated wood studs spaced a maximum of 24-inches on center. Lateral bracing installed as required. Minimum 4 pcf mineral wool friction fit between wood wall studs at each floorline. Height of mineral wool insulation shall be the same as the floor slab thickness.
<p>Perimeter Fire Barrier System</p>	<p>Perimeter fire barrier system complying with Section 715.4 of the 2021 IBC shall be installed, as applicable, to fill the void between the edge of the building floor slab and the interior surface of the exterior wall assembly (see Notes 1 and 2).</p>
<p>Stud Cavity Insulation – Use either 1, 2, 3, 4, 5, or 6</p> <p>Do not use Item 6 with Exterior Veneer System 11</p>	<ol style="list-style-type: none"> 1. None (for Base Wall Systems 1 and 2 only) 2. Fiberglass batt insulation (faced or unfaced) 3. Fiberglass spray-in insulation 4. Mineral wool insulation (faced or unfaced) 5. Sprayed cellulosic insulation complying with Section 720 of the IBC and ASTM C739 6. Hybrid Systems: spray foam and/or fiberglass insulation or mineral wool insulation (flash and batt insulation systems). An Engineering Judgment must be provided to demonstrate the spray foam has been certified for the intended use in accordance with NFPA 285 at the density and thickness intended for use.
<p>Exterior Sheathing – Use either 1, 2, 3, 4, or 5</p>	<ol style="list-style-type: none"> 1. None for Base Wall system 1 or 2 2. None for Base Wall system 3 when using 4-4.5 in. AP Foil or CI Foam Sheathing and Exterior Veneer systems 1, 2, 3, 4 or 5. 3. Minimum 1/2-inch-thick, exterior type gypsum sheathing complying with the applicable Code (For Base Wall system 3 and Exterior Veneer systems 1 through 5). 4. 5/8-inch-thick Type X exterior type gypsum sheathing (for Base Wall systems 3 and 4 and Exterior Veneer systems 1 through 10). 5. 5/8-inch-thick exterior gypsum sheathing complying with ASTM C1396 or ASTM C1177 (for Base Wall systems 1, 2, and 3, and Stud Cavity Insulations 1, 2, 3, 4 and 5)
<p>Water-Resistive Barrier (WRB) Material – Use either 1 or 2</p>	<ol style="list-style-type: none"> 1. None when AP™ Foil Faced Foam Sheathing insulation is installed per Section 5.2.2 of this report. CI Max® Foam Sheathing insulation requires a separate WRB material 2. Any water-resistive barrier complying with IBC Section 1403.2 or IRC Section 703.2 and shown to have both of the following: <ol style="list-style-type: none"> (a) a peak heat release rate of less than 150 W/m², a total heat release of less than 20 MJ/m², and an effective heat of combustion of less than 18 MJ/kg when tested on specimens at the thickness intended for use, in accordance with ASTM E1354, in the horizontal orientation, and at an incident radiant heat flux of 50 kW/m² (b) a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723, with test specimen preparation in accordance with ASTM E2404



Exterior Insulation	Maximum 3-1/2-inch thickness of AP™ Foil Faced Foam Sheathing polyisocyanurate insulation or CI Max® Foam Sheathing. Thickness may be increased to 4-1/2 inches when using Exterior Veneer System 1, 2, 3, 4, or 5
<p>Exterior Veneer System – Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or 11</p> <p>ACMs may only be used with Base Walls 1, 2 or 3, and Stud Cavity Insulations 1, 2, 3, 4 or 5</p>	<ol style="list-style-type: none"> 1. Brick – Standard nominal 4-inch-thick, clay brick with standard brick veneer anchors installed a maximum of 24 inches on-center vertically on each stud. A maximum 2-inch air gap between exterior insulation and brick. 2. Stucco – Minimum 3/4-inch-thick, exterior cement plaster and metal lath. A secondary water-resistive barrier can be installed between the exterior insulation and the lath. The secondary water-resistive barrier shall not be full-coverage asphalt or butyl-based self-adhered membranes. As an alternative, one-coat stucco (min. 3/8-inch-thick) recognized in a current research report for compliance with NFPA 285; foam plastic noted for Exterior Insulation above. 3. Stone veneer – Minimum 1-inch-thick limestone or natural stone veneer or minimum 1-1/2-inch-thick cast artificial stone veneer complying with ICC-ES AC51. Any standard installation technique may be used. 4. Porcelain, ceramic, or terracotta cladding – Use any porcelain, ceramic, or terracotta cladding system in which the cladding is minimum 1/2 inch thick. 5. Precast Concrete Panels or Concrete Masonry Unit (CMU) – Minimum 1-inch thick. Any standard non-open jointed installation technique may be used. 6. Autoclaved-Aerated Concrete (AAC) panels – Minimum 2-inch-thick AAC panels. 7. Thin Brick System – Minimum 3/4-inch-thick clay thin brick system fully adhered with cementitious mortar (standard or polymer modified) to minimum 1/2-inch-thick cement backer board or exterior gypsum sheathing. 8. Uninsulated Fiber Cement Board – Minimum 1/4-inch-thick fiber cement board which has been successfully tested in accordance with NFPA 285 on a wall assembly incorporating a foam plastic insulation having a similar density, thickness, and potential heat as the AP Foil insulation noted for Exterior Insulation above. 9. Stone and Aluminum Honeycomb Panels – Any composite panel which has been successfully tested in accordance with NFPA 285 on a wall assembly incorporating a foam plastic insulation having a similar density, thickness, and potential heat as the AP Foil insulation noted for Exterior Insulation above. 10. Solid Metal Panels – Minimum 3 mm thick steel, aluminum, or copper. Zinc shall not be used. 11. Any Aluminum Composite Metal (ACM) panel that has successfully passed NFPA 285 with foam plastic insulation having similar density, thickness, and potential heat as the AP Foil insulation noted for Exterior Insulation above. <p>Except where otherwise noted, any standard non-open jointed installation technique can be used for Systems 1 through 11.</p>
Opening Header, Sill, Jamb Protection	18-gauge, 4-inch-deep continuous “U” bar covering the edge of the foam plastic insulation. Minimum 26-gauge sheet metal flashing drip edge attached to “U” bar via rivets 8 inches on-center (Figures 1, 2, and 3)
Flashing of window, door and other exterior wall penetrations	As an option, flash around window, door, and other exterior penetrations with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid-applied membrane material with or without fiber mesh reinforcement.

Note 1: Building Code section references may change in different editions of the IBC.

Note 2: Fireblocking per Section 718 of the 2021 IBC and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.



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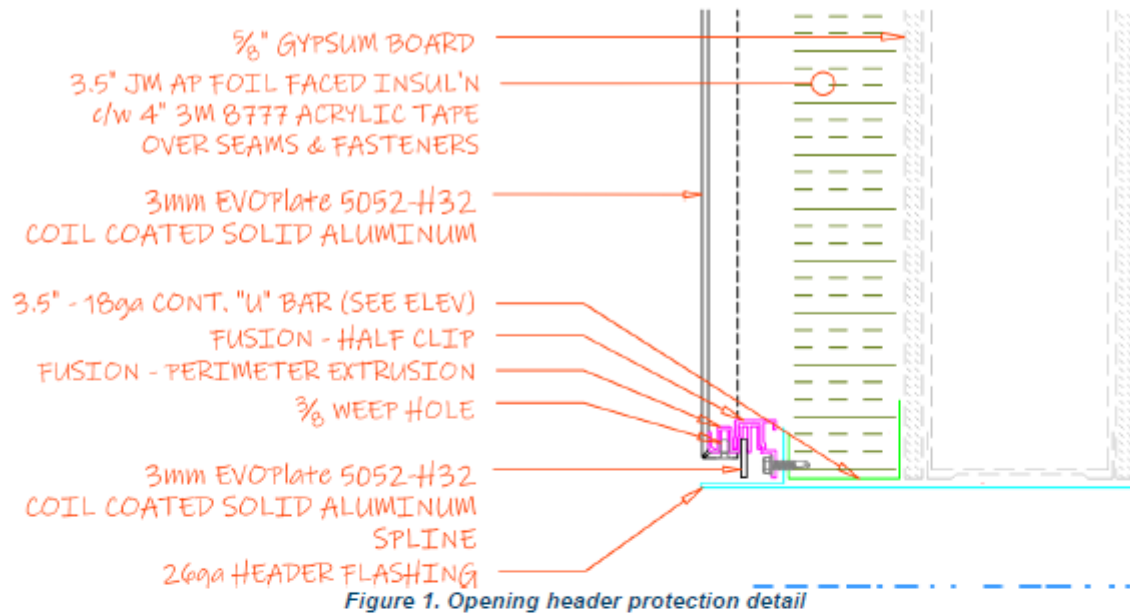


Figure 1. Opening header protection detail

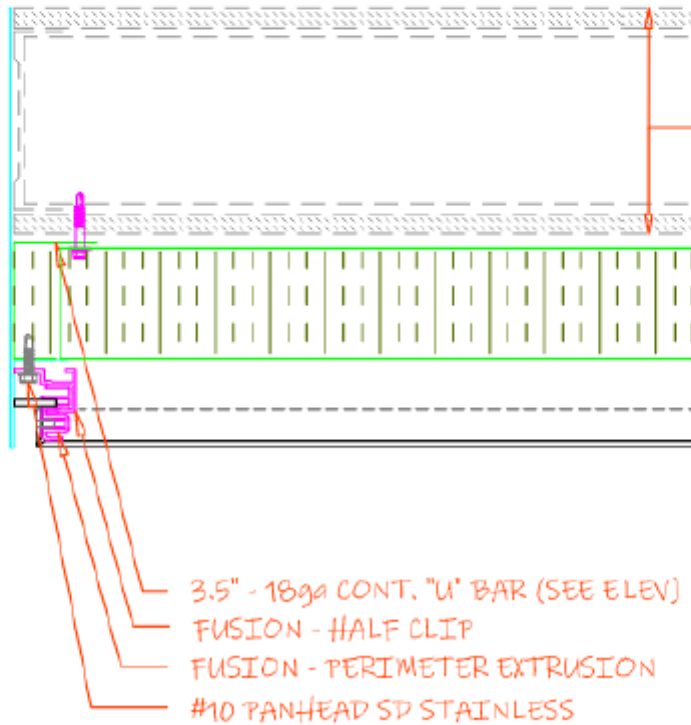


Figure 2. Opening jamb protection detail



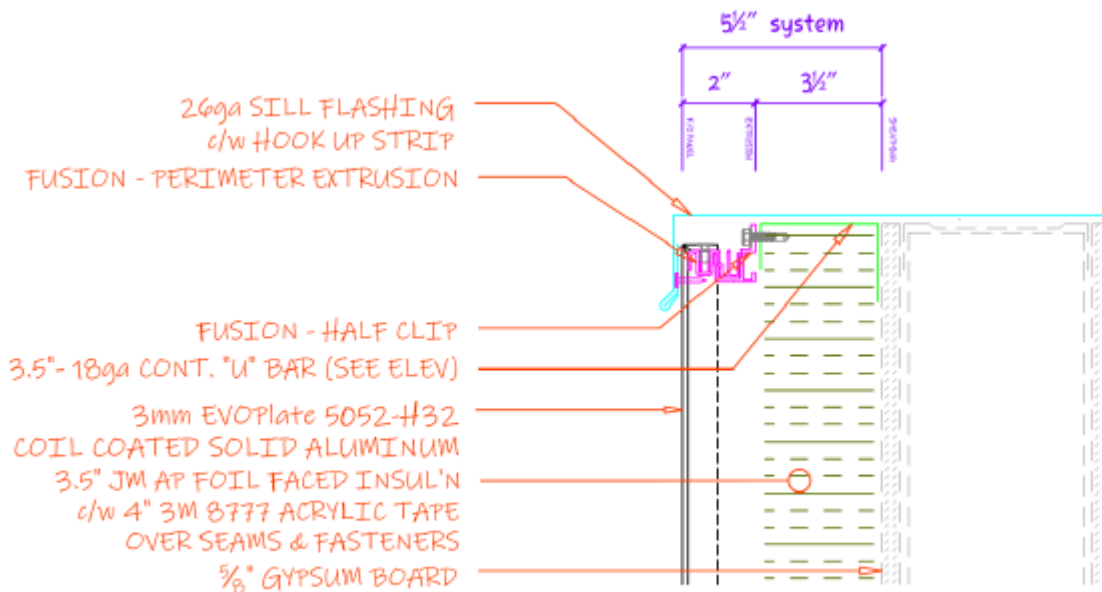


Figure 3. Opening sill protection detail

JM AP[®] Foil-Faced Foam Sheathing

Continuous Insulation Wall System

All-in-One Air Barrier, Vapor Retarder, and Water-Resistive Barrier

- 1** JM AP[®] Foil-Faced Foam Sheathing¹
- 2** Cavity Insulation¹
Options include batts and rolls, blown-in, mineral wool, spray foam, rigid or empty.
- 3** Joint and Penetration Sealing. Use JM-recommended components including 3M All-Weather Flashing Tape and Sealants
- 4** JM Recommended Plates and Fasteners²
- 5** Interior Wall Board
- 6** Concrete, concrete masonry unit, steel stud or wood
- 7** Exterior Sheathing
- 8** Exterior Cladding – Brick, Stucco, Natural Stone, Concrete, Terracotta, or Other Material that Meets Code.

¹ Insulation materials is available from JM.
² Attachment method may vary depending on wall assembly components and local building code requirements.
Wall assembly is for reference only and not to be used as a substitute for professional engineering design and documentation required by building code, contract, or applicable laws.

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Figure 4 – Water-resistive Barrier – Typical Installation Details



REPORT SUPPLEMENT - SEAL & INSULATE WITH ENERGY STAR

1.0 SCOPE OF EVALUATION

1.1 This Supplement addresses compliance with the Seal & Insulate with ENERGY STAR Program, *Definitions and Testing Requirements for Residential Insulation, Version 1.0*.

1.2 The AP™ Foil-Faced Continuous Insulation and CI MAX® polyisocyanurate insulation products described in this report (CCRR-0444) have been evaluated for the following properties:

- Surface burning characteristics
- Thermal resistance

1.3 The AP™ Foil-Faced Continuous Insulation described in this report is recognized for use on the exterior of exterior above-grade walls, the interior of basement walls and on the underside of floor joists in crawl spaces. CI MAX® insulation described in this report is recognized for exposed use on interior walls.

2.0 STATEMENT OF COMPLIANCE

The AP™ Foil-Faced Continuous Insulation and CI MAX® polyisocyanurate insulation products comply with the requirements of the Seal & Insulate with ENERGY STAR program requirements.

3.0 DEFINITIONS

3.1 Insulation: Any material mainly used to slow down heat flow. It may be mineral or organic, fibrous, cellular, or reflective (aluminum foil). It may be in rigid, semi-rigid, flexible, or loose-fill form.

3.2 Facing: A thin covering adhered to the surface of insulation prior to field installation. Facings may include, but are not limited to, kraft paper, metal foil, and polymer.

3.3 Residential Building: Single family homes (attached or unattached), multifamily buildings with 4 units or fewer, or multifamily buildings (e.g., condominiums and apartments) with 3 stories or less in height above grade.

3.4 Board Insulation: Semi-rigid or rigid insulation preformed into rectangular units having a degree of suppleness particularly related to their geometrical dimensions. Typical materials include, but are not limited to, fiberglass, expanded polystyrene (EPS), extruded polystyrene (XPS), polyisocyanurate, and polyurethane. The product may or may not be faced.

3.5 R-value: The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. R-value is described in units of h·ft²·°F/Btu.

3.6 Smoke-development Index: The characteristic of a material to emit smoke when exposed to flame or fire compared to red oak and inorganic cement.

3.7 Flame-spread Index: The characteristic of a material to resist the spreading of flames when exposed to flame or fire compared to red oak and inorganic cement.

4.0 BASIC INFORMATION

4.1 Product Description: The insulation products are described in Section 3 of the main report.

4.2 Testing Laboratories: Test reports used in this evaluation were produced by laboratories accredited for the tests in question, as required by the Conditions and Criteria for Recognition of Insulation Certification Bodies for the ENERGY STAR Program.

4.3 Product Sampling: Samples used for testing were traceable samples.

5.0 PERFORMANCE CHARACTERISTICS

5.1 Physical Properties: AP Foil™ and CI MAX® insulation comply with ASTM C1289 as Type I, Class 1 and Class 2.

5.2 Surface Burning Characteristics: The insulation products have a flame spread index of 25 or less and a smoke developed index of 450 or less, when tested in accordance with ASTM E84 (UL 723). The insulation





boards comply with the minimum Code requirements for surface burning characteristics.

5.3 Thermal Resistance: The insulation boards have a thermal resistance (R-value) shown in Table 2 of the main report. The insulation boards comply with the minimum requirement of $R \geq 3.0$ for the Seal and Insulate Program.

6.0 INSTALLATION

6.1 General: The insulation boards must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The manufacturer's instructions are provided within this supplement.





AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Exterior Walls

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating exterior walls. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). When applied to the exterior face of wood, steel, or concrete to cover all structure, sills and headers, Johns Manville AP™ Foil-Faced insulation provides a layer of continuous insulation to prevent heat flow through details not normally covered by insulation products. AP™ Foil-Faced insulation is light-weight and easy to install. It may be installed with seams taped and penetrations sealed to function as an air barrier and water-resistive barrier (WRB), or it may be installed in conjunction with a separate WRB system.

Before You Begin:

Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by a minimum of ½-inch gypsum board or equivalent 15-minute thermal barrier as required by code. Repair any water leaks or structural cracks in the wall. Gather all materials.

Special training and/or certification is not required. This product is designed for an easy install for both DIYs and professional contractors.

Warning: Polyisocyanurate foam is an organic material which will burn when exposed to an ignition source of sufficient heat and intensity and may contribute to flames spreading. Boards must not be in direct contact with hot objects requiring a certain amount of clearance. Refer to equipment/ fixture rating for guidance.

Occupancy time after installation: There are no specific requirements related to re-entry or re-occupancy time after installation of the insulation.

Materials Checklist

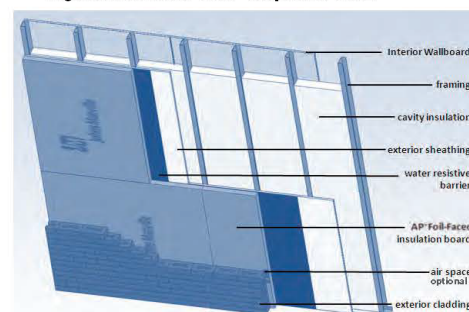
- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Mechanical fasteners such as masonry nails with 1-inch metal washers, or JM Ultrafast CI Plates and JM Ultrafast CI Phillips screws
- Single component, moisture-cure silicone sealant
- Concrete WRB, if desired

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board, create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.



Figure 1. Framed Wall – Separate WRB



enough to penetrate framing at least ¾ inch, or ¾ inch head galvanized roofing nails long enough to penetrate at least ¾ inch, or 1-inch crown 16-gauge wire staples long enough to penetrate at least ½ inch. Drive fasteners flush with board, but do not countersink. Space fasteners in the perimeter and in the field of the board consistent with the framing, but not greater than 24 inches.

Installation

OPTION 1: Framed Wall – Separate WRB

1. If a WRB is already installed over the exterior sheathing, care should be taken to maintain its integrity while installing AP™ Foil-Faced boards. Self-sealing flashing tape should be applied to the WRB where fasteners are expected for insulation or cladding attachment, to prevent fasteners from creating air or water leaks. For liquid/spray/trowel-applied WRB materials, verify manufacturer's recommended cure time before installing foam boards.
2. Install AP™ Foil-Faced boards horizontally or vertically over exterior sheathing. Use maximum board lengths to minimize the number of joints. The insulation board joints should be staggered relative to structural sheathing (OSB or non-insulated sheathing) joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.
EXCEPTION: If vinyl siding is to be installed over AP™ Foil-Faced sheathing, install foam boards with the white nonreflective side toward the vinyl siding.
3. Fasten insulation using 1-inch head plastic cap nails long

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AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

OPTION 1: Framed Wall – Separate WRB - Continued

4. Use a utility knife and straight edge to trim the insulation board to conform to irregular wall angles, projections or wall surfaces. Repair any boards damaged during installation. Patch holes less than 1 inch across with flashing tape. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
5. If a WRB was not installed under the AP™ Foil-Faced sheathing, install WRB over insulation per WRB manufacturer's instructions. Adjust fastener lengths to account for the thickness of the foam sheathing.
6. Brick, wood, hardboard, aluminum or vinyl sidings may be fastened to the wood frame construction through the insulation in accordance with the siding manufacturer's instructions, complying with IRC Section R703.2, as applicable.
7. Cement board, shakes or shingles may also be applied by installing furring strips or a plywood nailer base over the insulation and attaching the siding in accordance with the manufacturer's instructions, complying with IRC Section R703.2, as applicable.
8. Install cladding systems as soon as possible, preferably within 60 days.

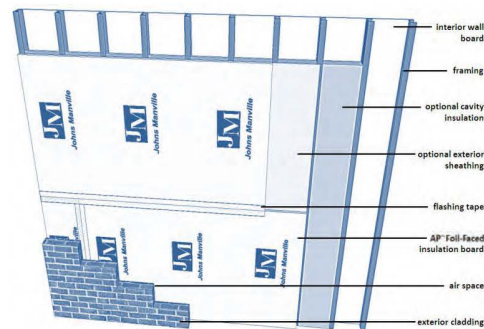
OPTION 2: Framed Wall – AP™ Foil-Faced as WRB

1. Install AP™ Foil-Faced boards either directly to framing or over exterior sheathing. If over exterior sheathing, insulation board joints should be staggered relative to exterior sheathing. Install boards horizontally or vertically using maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the non-reflective white side should be oriented to the interior.

EXCEPTION: If vinyl siding is to be installed over AP™ Foil-Faced sheathing, install foam boards with the white nonreflective side toward the vinyl siding.

2. Secure AP™ Foil-Faced boards using recommended 2-inch capped fasteners with no. 10 self tapping screws long enough to penetrate framing a minimum of three threads (*only for steel framing*). Drive fasteners flush with board, but do not countersink. Suggested fastener spacing is 16 inches on center or less around the board perimeter and in the field.
3. To create an air/water-resistive barrier, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. 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.
4. Seal penetrations and panel defects with recommended sealant.
5. Use a utility knife and straight edge to trim the insulation board to conform to irregular angles, projections or wall surfaces. Repair boards damaged during installation. Patch holes less than 1 inch across with flashing tape and/or sealant. Patch holes greater than 1 inch across with matching board material and seal with flashing tape.

Figure 2. Framed Wall – AP™ Foil-Faced as WRB



6. Brick, wood, hardboard, aluminum, or vinyl sidings may be fastened to the wood frame construction through the insulation in accordance with the siding manufacturer's instructions. Seal penetrations with recommended sealant. This step will help reduce air or water leaks around cladding attachments, complying with IRC Section R703.2, as applicable.
7. Cement board, shakes or shingles may also be applied by installing furring strips or a plywood nailer base over the insulation and attaching the siding in accordance with the manufacturer's instructions. Self-sealing flashing tape should be applied to the AP™ Foil-Faced board under where nailers or furring strips will be installed. This step will help reduce air or water leaks around fasteners used to secure these elements, complying with IRC Section R703.2, as applicable.
8. Install cladding systems as soon as possible, preferably within 60 days.





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A Berkshire Hathaway Company

AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

FIGURE 3. TYPICAL WINDOW FLASHING DETAIL



FIGURE 4. TYPICAL PENETRATION FLASHING DETAIL - FLANGED

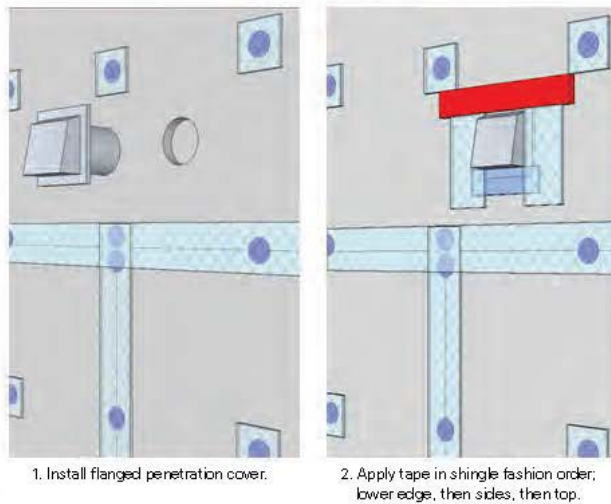


FIGURE 5. TYPICAL PENETRATION FLASHING DETAIL - UNFLANGED





AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

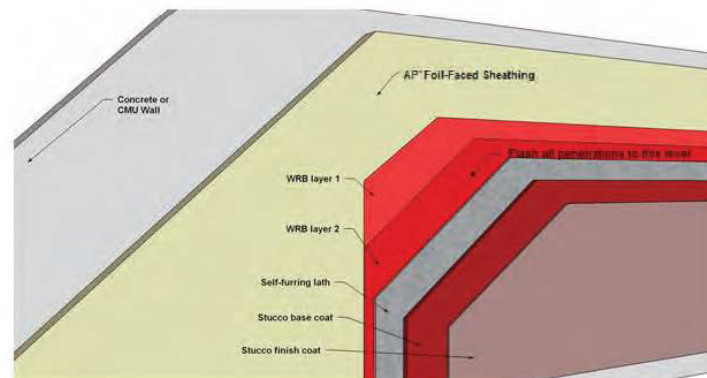
OPTION 3: Concrete / Block Wall – Separate WRB – Stucco – Maximum 1-1/2” Insulation

1. Install AP™ Foil-Faced boards horizontally or vertically over concrete or block wall. Use maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.
2. Insulation may be held in place temporarily with 1- to 2-inch size spots of high-quality construction adhesive, spaced approximately 16 inches each direction.
3. Foam insulation boards must be fastened to the concrete or block wall. This can be done either separately or in conjunction with the lath fasteners. If separately, fasten using power-driven masonry nails with 1-inch minimum metal washers or caps, or other suitable masonry fastener. Fasteners should penetrate 1-inch minimum into the concrete. Space fasteners approximately 24 inches on center.
4. Drive fasteners flush with board (or lath), but do not countersink fasteners or lath into foil facing.
5. Install 2 layers of WRB over AP™ Foil-Faced sheathing per WRB manufacturer's instructions. Adjust fastener lengths to account for the thickness of the foam sheathing.
6. Install self-furring lath through insulation to concrete / block wall in accordance with the lath manufacturer's instructions.
7. Install stucco system over lath in accordance with the stucco manufacturer's instructions.
8. Install stucco system as soon as possible, preferably within 60 days.

Alternate WRB options:

- A. One separate WRB behind AP™ Foil-Faced Sheathing
- B. AP™ Foil-Faced Sheathing taped joints + 1 layer WRB (building paper)

Figure 6. Concrete / Block Wall – Stucco

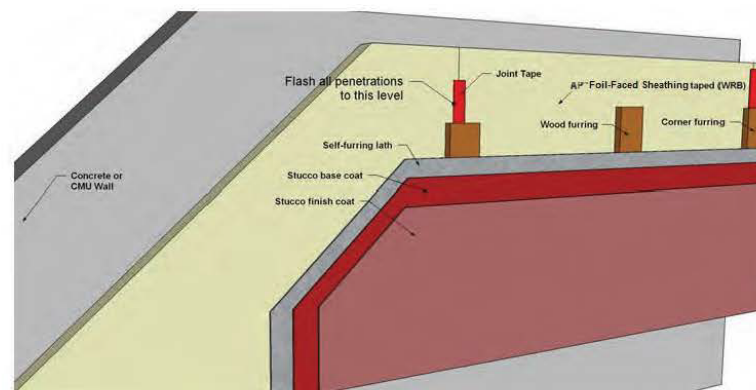


OPTION 4: Concrete / Block Wall – AP™ Foil as WRB – Stucco – 1-1/2” or greater Insulation

1. Install AP™ Foil-Faced boards horizontally or vertically over concrete or block wall. Use maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.
2. Insulation may be held in place temporarily with 1- to 2-inch size spots of high-quality construction adhesive, spaced approximately 16 inches each direction.
3. Foam insulation boards must be fastened to the concrete or block wall. This can be done either separately or in conjunction with the wood furring fasteners. Fasteners should penetrate 1-inch minimum into the concrete (unless otherwise specified by the stucco/lath manufacturer).
4. Fasteners shall not be spaced more than 24 inches on center.

Installation (continued)**OPTION 4: Concrete / Block Wall – AP™ Foil as WRB – Stucco – 1-1/2" or greater Insulation - Continued**

- To create an air/water-resistive barrier, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. 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.
- Seal penetrations and panel defects with recommended sealant.
- Install wood furring and attach fasteners through insulation to concrete / block wall in accordance with manufacturer's instructions. Drive fasteners flush with furring strips, do not countersink or drive wood furring into foil facers.
- Install self-furring lath to furring strips in accordance with manufacturer's instructions.
- Install stucco system over lath in accordance with the stucco manufacturer's instructions.
- Install stucco system as soon as possible, preferably within 60 days.

Figure 7. Concrete / Block Wall – Stucco**OPTION 5: Existing Wall – AP™ Foil-Faced Insulation Over Siding**

- Correct all moisture-related wall problems before proceeding with new siding application. Because each type of siding may require specific application details, consult siding manufacturer's instructions before beginning. Existing siding should be structurally sound; secure loose siding and repair or replace rotted siding, trim, sills and corner posts, etc. before residing. Remove all gutters, downspouts, shutters, molding and old caulking around windows and doors.
- Fasten AP™ Foil-Faced insulation over existing siding. Secure AP™ Foil-Faced boards using recommended 2-inch capped fasteners with no. 10 self tapping screws long enough to penetrate framing a minimum of three threads (*only for steel framing*). Drive fasteners flush with board, but do not countersink. Suggested fastener spacing is 24 inches on center or less around the board perimeter and in the field. Jamb, frame or sill extenders may be required depending on thickness of insulated sheathing used as well as siding manufacturer's application instructions. It is recommended that AP™ Foil-Faced insulation boards be installed vertically.
- If the AP™ Foil-Faced insulation will also be used as a WRB, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. 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.



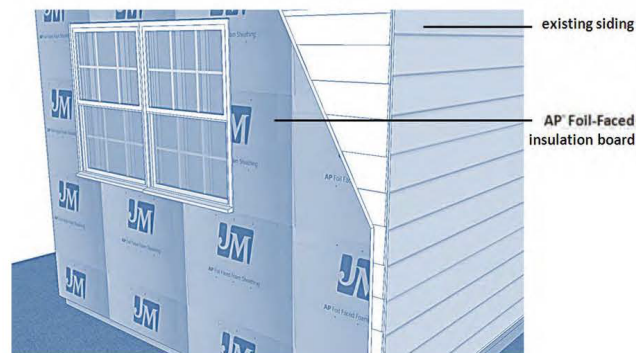
AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

OPTION 5: Existing Wall – AP™ Foil-Faced Insulation Over Siding - Continued

4. Seal penetrations and panel defects with recommended sealant.
5. Use a utility knife and straight edge to trim the insulation board to conform to irregular wall angles, projections or wall surfaces. Repair any boards damaged during installation. Patch holes less than 1 inch across with flashing tape and/or sealant. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
6. New siding is applied in accordance with the manufacturer's instructions. Ensure that fasteners are long enough to penetrate both the AP™ Foil-Faced insulating sheathing and the normal securing substrate to a depth recommended by the siding manufacturer, complying with IRC Section R703.2, as applicable.

Figure 8. Existing Wall – AP™ Foil-Faced Insulation Over Siding



Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

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AP™ Foil-Faced Residential Installation Instructions Below-Grade Interior Walls

Interior Basement Wall

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating the interior side of below grade walls. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). AP™ Foil-Faced insulation is lightweight and easy to install. It can be installed on the interior of a basement wall by either direct attachment or using wood furring strips. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed. Regardless, the AP Foil acts as a vapor barrier and no additional vapor barrier should be installed in a basement application.

Before You Begin:

Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by a minimum of ½-inch gypsum board or equivalent 15-minute thermal barrier as required by code. Repair any water leaks or structural cracks in the wall. Gather all materials.

Special training and/or certification is not required. This product is designed for an easy install for both DIYs and professional contractors.

Warning: Polyisocyanurate foam is an organic material which will burn when exposed to an ignition source of sufficient heat and intensity and may contribute to flames spreading. Boards must not be in direct contact with hot objects requiring a certain amount of clearance. Refer to equipment/ fixture rating for guidance.

Occupancy time after installation: There are no specific requirements related to re-entry or re-occupancy time after installation of the insulation.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive such as Liquid Nails® or Loctite®
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Mechanical fasteners such as masonry nails with 1-inch metal washers
- Single component, moisture-cure silicone sealant

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board, create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.

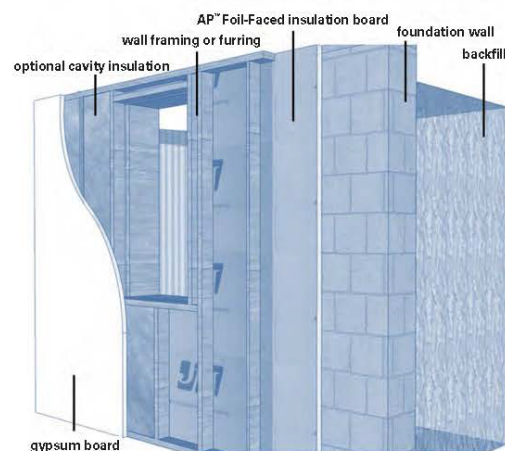


Installation

OPTION 1: Direct Attachment

1. Use maximum board lengths to minimize the number of joints.
2. Install AP™ Foil-Faced insulation over the interior side of foundation walls using construction-grade adhesive or masonry nails or screws with 1-inch washers or caps. Place the reflective side facing the interior, and the nonreflective side facing the foundation wall.
3. Fasteners should penetrate 1 inch minimum into the concrete. Space fasteners approximately 24 inches on center around the perimeter and in the field of each board. Drive fasteners so that the washer is flush with the board surface, but do not countersink.
4. Butt board edges together tightly and carefully fit around penetrations. Patch holes less than 1 inch across with flashing tape or sealant. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
5. Cover AP™ Foil-Faced insulation with a minimum ½-inch gypsum board or equivalent 15-minute thermal barrier as required by local building code.

Figure 1. Below-Grade Interior Direct Attachment





AP™ Foil-Faced Residential Installation Instructions Below-Grade Interior Walls

Installation (continued)

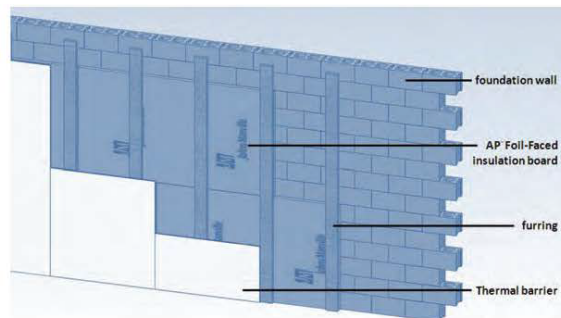
OPTION 1: Direct Attachment - Continued

6. Build a conventional stud wall that firmly presses foam insulation against basement wall.
7. For additional R-value, install insulation between the wall studs. Options for insulating between studs include Johns Manville Formaldehyde-free™ Unfaced fiber glass batts, JM Climate Pro® blown-in fiber glass in the Blow-In-Blanket® system, JM Spider® Plus Blow-in Custom Fiber Glass Insulation System or other approved cavity insulation product.
8. Install ½-inch gypsum board or equivalent 15-minute thermal barrier over wall framing as required by local building code. Tape and finish according to manufacturer's instructions.

OPTION 2: Wood Furring

1. Install AP™ Foil-Faced insulation over the interior side of foundation walls, butting board edges together tightly. Insulation boards can be held in place with 1- to 2-inch spots of construction-grade adhesive, spaced 16–24 inches in each direction. Place the reflective side facing the interior, and the nonreflective side facing the foundation wall.
2. Apply suitable wood furring strips a maximum of 24 inches on center vertically over the insulation. Use appropriate mechanical fasteners, such as masonry nails or screws, spaced 24 inches on center. Fasteners should be long enough to penetrate masonry approximately one inch, and furring strips should cover vertical seams between insulation boards.
3. Install ½-inch gypsum board or equivalent 15-minute thermal barrier over furring strips. Tape and finish according to manufacturer's instructions. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed.

Figure 2. Below Grade Interior Wood Furring Attachment



Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

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AP™ Foil-Faced Residential Installation Instructions Crawl Spaces

Crawl Spaces

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating crawl spaces. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). AP™ Foil-Faced insulation is lightweight and easy to install. It can be installed in both vented and unvented crawl spaces. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed. In crawl spaces where entry is made only for service of utilities, AP™ Foil-Faced insulation must be covered with an approved ignition barrier and cannot be left exposed. The insulation boards can be used at the perimeter or under flat concrete slab on grade construction, or on the exterior or interior of basement foundation walls in any construction type.

Before You Begin:

Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by either a thermal barrier or ignition barrier as required by code. Repair any water leaks or structural cracks in the wall, and address any pest problems. Gather all materials and clear work area.

Special training and/or certification is not required. This product is designed for an easy install for both DIYs and professional contractors.

Warning: Polyisocyanurate foam is an organic material which will burn when exposed to an ignition source of sufficient heat and intensity and may contribute to flames spreading. Boards must not be in direct contact with hot objects requiring a certain amount of clearance. Refer to equipment/ fixture rating for guidance.

Occupancy time after installation: There are no specific requirements related to re-entry or re-occupancy time after installation of the insulation.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive such as Liquid Nails
- Mechanical fasteners such as masonry nails with 1-inch metal washers or caps
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Single component, moisture-cure silicone sealant
- Canned foam such as Touch'n Seal All Season, Hilti CF 810 or CF-F, Dow Great Stuff or Great Stuff Pro

Installation

OPTION 1: Vented Crawl Space

1. The crawl space should be vented in accordance with local building code requirements.
2. If desired, install cavity insulation between the floor joists. Options for insulating between joists include JM Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm®), JM Climate Pro® blown-in fiberglass, JM Spider® Plus Custom Insulation System, JM Corbond® spray foam, or other approved cavity insulation. Fiberglass batts should be installed without compression. The amount of insulation will depend on the product chosen and the depth of the joists.
3. Fiberglass batts must be secured with wire staves or netting to prevent the insulation from falling out of the joist cavity before foam board insulation is installed.
4. Install AP™ Foil-Faced insulation boards across the bottom of the floor joists. This will prevent future condensation and increase the floor's overall insulation value.
5. Use maximum board lengths to minimize number of joints. Locate joints square to joists and center end joints over joists. Provide additional blocking as necessary. It is

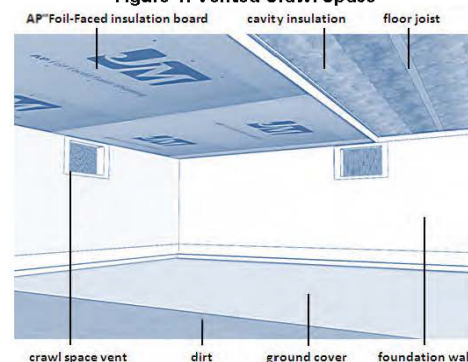
Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board, create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.



not necessary to stagger board joints. Butt board edges together tightly, and carefully fit around openings and penetrations.

Figure 1. Vented Crawl Space





AP™ Foil-Faced Residential Installation Instructions Crawl Spaces

Installation (continued)

OPTION 1: Vented Crawl Space - Continued

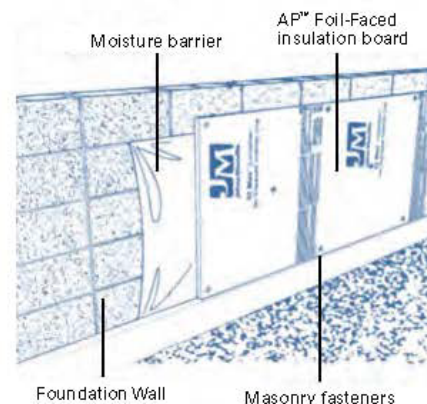
6. Fasten insulation boards to the bottom of the joists using screws or nails with 1-inch minimum washers or caps. Fasteners should be long enough to penetrate in to the joist a minimum of ¾ inch. Drive fasteners flush with the board, but do not countersink. Space fasteners approximately 24 inches on center around the perimeter and in the field of each board (16 or 24 inches on center across joists, depending on spacing).
7. To increase air sealing, board edges may be taped and all penetrations sealed with single component, moisture-cure silicone sealant.
8. Cover exposed foam board insulation with either a thermal barrier or ignition barrier as required by local building code and occupancy of the crawl space.
9. In cold climates, be sure to insulate any plumbing lines that extend below the crawl space insulation.
10. All heating and cooling ducts in the crawl space should be sealed and insulated appropriately.
11. A ground cover must be installed to reduce moisture levels in the crawl space.

OPTION 2: Unvented Crawl Space

IMPORTANT NOTE: Some applications may require a 2- to 3-inch inspection strip along the top of the foundation wall for termite mitigation. Always adhere to local building codes.

1. Install wall section of crawl space moisture barrier. Barrier should consist of 6 mil minimum polyethylene sheeting wide enough to extend from the top of the foundation wall to at least 12 inches onto the ground.
2. Install AP™ Foil-Faced insulation from the top of the footing to the top of the foundation wall.
3. Fasten AP™ Foil-Faced boards to the interior of the foundation wall using power-driven masonry nails with 1½-inch minimum metal washers or caps, or other suitable masonry fastener.
4. Space fasteners approximately 24 inches on center across the short board dimension and 48 inches on center across the long board dimension.
5. Butt board edges together tightly and carefully fit around penetrations.
6. Cover exposed foam board insulation with either a thermal barrier or ignition barrier as required by local building code and occupancy of the crawl space.
7. Air seal the interface between the top of the foundation wall and the mud sill with caulk or expanding foam.
8. Air seal and insulate the inside of the band joist with the following options:
 - a. Seal with expanding canned foam and insulate with JM Formaldehyde-free™ fiberglass batts Unfaced, Faced or Com fortTherm®).
 - b. Cut pieces of foam board to fit tightly into each band joist space. Install and seal in place with expanding canned foam. Multiple layers of foam board may be used to achieve the desired R-value. Foam boards in band joists are not required to be covered for fire.
 - c. Air seal and insulate the band joist with JM Corbond spray foam. Open cell spray polyurethane foam should not be used to insulate band joists in cold climates.
9. A ground cover must be installed to reduce moisture levels in the crawl space.
10. Unvented crawl spaces must include mechanical ventilation to control humidity.

Figure 2. Unvented Crawl Space





AP™ Foil-Faced Residential Installation Instructions Crawl Spaces

Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

BID-0152 8/9/22 (replaces 2/16/21)

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**CI MAX™****INSULATION FOR EXPOSED INTERIOR USE
INSTALLATION INSTRUCTIONS**

The following installation recommendations relate to the installation of CI Max Polyisocyanurate Foam Sheathing in an exposed condition on the interior of a building. CI Max foam sheathing is designed to be installed in the applications described below without the addition of a thermal barrier.

GENERAL

1. CI Max foam sheathing is not a structural material. It must not be used as a nailing base for any other building products.
2. CI Max foam sheathing passed NFPA 286 corner burn test for walls only or ceiling only without joint treatment. Boards need to be tightly butted. Taping the seams is acceptable with tapes that have a flame spread index of 25 or less and a smoke developed index of 450 or less.
3. All framed walls insulated with CI Max foam sheathing must be properly braced for lateral loads according to local building codes.
4. Consult local building codes and authorities regarding special applications or details required when using CI Max foam sheathing as an exposed product.
5. The interior and/or exterior of the building should be protected with a suitable vapor retarder and/or air barrier/weather resistive barrier, based on local building codes and climate zone.
6. Repair any boards damaged during installation. Patch holes less than one inch across with seam tape. Patch holes greater than one inch across with matching board material and then seal with flashing tape that have a flame spread of 25 or less and a smoke development of 450 or less.
7. Special training and/or certification is not required. This product is designed for an easy install for both DIYs and professional contractors.
8. Warning: Polyisocyanurate foam is an organic material which will burn when exposed to an ignition source of sufficient heat and intensity and may contribute to flames spreading. Boards must not be in direct contact with hot objects requiring a certain amount of clearance. Refer to equipment/ fixture rating for guidance.
9. Occupancy time after installation: There are no specific requirements related to re-entry or re-occupancy time after installation of the insulation

MASONRY WALLS

- CI Max foam sheathing may be installed to the interior of masonry walls, including above-grade masonry and tilt-up walls and below-grade basement and crawl space walls.
- Walls should already have any required air/water/vapor barriers or damp-proofing installed prior to installation of CI Max foam sheathing.
- Below-grade applications may require additional materials to effectively manage water, water vapor and/or radon.
- Some below-grade applications may require a two- to three-inch inspection strip along the top of the foundation wall for termite mitigation. Always adhere to local building code or pest control requirements.

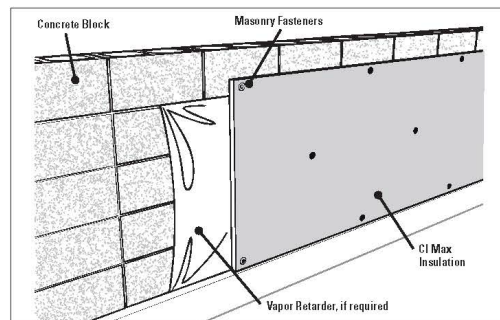


Figure 1. CI Max boards mechanically fastened

FASTEN CI MAX INSULATION DIRECTLY TO THE WALL

1. Fasten CI Max insulation boards to the interior of the wall using power-driven masonry nails with 1½-inch minimum diameter metal washers or caps, or other suitable masonry fastener. For crawl space wall installation, CI Max insulation should be installed horizontally (as shown in Figure 1). For basement installations, CI Max insulation can be installed either vertically or horizontally.
2. Space fasteners approximately 24 inches on center across the short board dimension and 48 inches on center across the long board dimension.
3. Butt board edges together tightly and carefully fit around penetrations. CI Max foam sheathing may be installed and left exposed without joint treatment. However, tape may be installed to reduce air leakage using aluminum or white foil tape that has a flame spread of 25 or less and a smoke development of 450 or less.

FASTEN CI MAX INSULATION OVER FURRING STRIPS

1. Install wood or pressure-treated wood furring strips, preferably spaced not more than 24 inches on center. Furring strips may be installed with power-driven masonry nails.
2. Install CI Max board over furring strips. Butt board edges together tightly, align seams over furring strips, and carefully fit around openings and penetrations. CI Max foam sheathing may be installed and left exposed without joint treatment. However, tape may be installed to reduce the air leakage of the wall system using aluminum or white foil tape that must have a flame spread of 25 or less and a smoke developed index of 450 or less.



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3. Fasten insulation boards to the furring strips using screws or roofing nails with a 1½-inch minimum metal washer or top cap. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing.

Table 1

Insulation Thickness	Masonry Screw Length
½"	1"
.77"	1½"
1"	1½"
1½"	2"
2"	2½"
2½"	3"
3"	3½"
3½"	4"
4"	4½"
Special Order Thickness	Thickness + ½"

FRAMED WALLS

1. Fasten CI Max insulation boards to the interior of the framing using #6 screws or nails with 1½-inch minimum metal washers or caps as described in Table 2. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing.
2. Space fasteners approximately 16 inches on center around the perimeter and in the field of each board. (16 or 24 inches on center across framing, depending on framing spacing.)
3. Use maximum board lengths to minimize number of joints. Locate joints square to framing and center end joints over framing (as shown in Figure 2). Provide additional framing as necessary. It is not necessary to stagger board joints.
4. Butt board edges together tightly and carefully fit around openings and penetrations.
5. Drive fasteners so the stress plate/washer is tight and flush with the board surface but do not countersink.
6. CI Max sheathing may be installed and left exposed without joint treatment. However, tape may be installed to reduce air leakage, using aluminum or white foil tape that must have a flame spread of 25 or less and a smoke developed index of 450 or less.

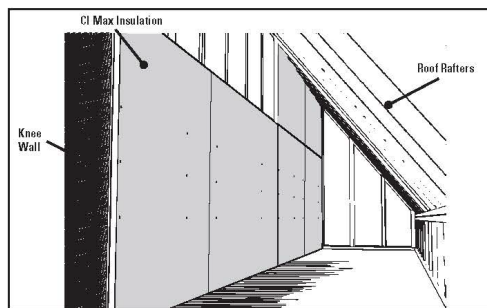


Figure 2. Knee wall installation of CI Max boards

Table 2

Insulation Thickness	Screw Length
½"	1½"
.77"	1½"
1"	1¾"
1½"	2¼"
2"	2¾"
2½"	3¼"
3"	3¾"
3½"	4¼"
4"	4¾"
Special Order Thickness	Thickness + ¾"

PRE-ENGINEERED METAL BUILDINGS

1. All exterior wall panels should be installed. To avoid moisture accumulation within the wall, one of the following recommendations should be followed
 - a. If the joints of CI Max insulation will be sealed to reduce air leakage, any fiber glass metal building insulation blankets should have perforated facings to avoid a double vapor retarder in the wall system.
 - b. If the joints of CI Max insulation will not be sealed, no change is required to the metal building insulation blankets.
2. Install CI Max insulation over the interior face of the wall girts.
3. Use maximum board lengths to minimize number of joints. Locate joints square to girts and center end joints over girts. Provide additional framing as necessary. Stagger each course at least one girt. See Figure 3.

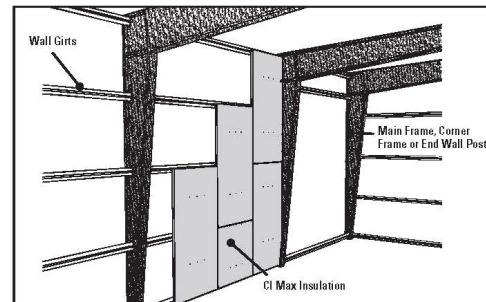


Figure 3. CI Max boards on interior of pre-engineered metal building

4. Butt board edges together tightly and carefully fit around openings and penetrations.
5. Fasten the insulation board to the face of the girts using preassembled screw and metal stress plate fasteners as described in Table 2. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing.
6. Fasteners should be spaced 12 inches, across the face of each girt, as shown in Figure 4. Drive fasteners so the metal stress plate is tight and flush with the board surface but do not countersink.





CI MAX™ INSULATION FOR EXPOSED INTERIOR USE INSTALLATION INSTRUCTIONS

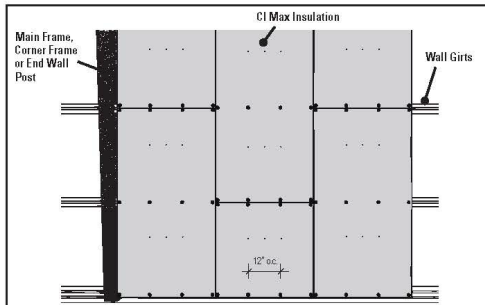


Figure 4. Fastener spacing for CI Max foam sheathing over the interior of pre-engineered metal building girts

INTERIOR CEILINGS

CI Max foam sheathing may be installed onto interior ceilings, including framed (wood or metal) or masonry constructions.

MASONRY/CONCRETE CEILINGS

1. Fasten CI Max insulation boards to the interior of the ceiling using power-driven masonry nails with 1½-inch minimum metal washers or caps, or other suitable masonry fastener.
2. Space fasteners approximately 24 inches on center across the short board dimension and 48 inches on center across the long board dimension
3. Butt board edges together tightly and carefully fit around penetrations.

MASONRY/CONCRETE CEILINGS OVER FURRING STRIPS

1. Install wood or pressure-treated wood furring strips, preferably spaced not more than 24 inches on center. Furring strips may be installed with power-driven masonry nails.
2. Install CI Max board over furring strips. Butt board edges together tightly, align seams over furring strips, and carefully fit around openings and penetrations. CI Max foam sheathing may be installed and left exposed without joint treatment. However, tape may be installed to reduce the air leakage of the wall system using aluminum or white foil tape that must have a flame spread of 25 or less and a smoke developed index of 450 or less.
3. Fasten insulation boards to the furring strips using screws or roofing nails with a 1½-inch minimum metal washer as described in Table 1 above. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing.
4. Fasteners should be spaced 24 inches on center across the short board dimension and 48 inches on center across the long board dimension along each furring strip. Drive fasteners so the plate or washer is tight and flush with the board surface but do not countersink.

FRAMED CEILINGS

1. Fasten CI Max insulation boards to the interior of the ceiling framing using #6 screws or nails with 1½-inch minimum metal washers or caps as described in Table II. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing.
2. Space fasteners approximately 16 inches on center around the perimeter and in the field of each board. (16 or 24 inches on center across framing, depending on framing spacing.)
3. Use maximum board lengths to minimize number of joints. Locate joints square to framing and center end joints over framing. Provide additional framing as necessary. It is not necessary to stagger board joints. See Figure 5.
4. Butt board edges together tightly and carefully fit around openings and penetrations.
5. Drive fasteners so the stress plate is tight and flush with the board surface but do not countersink.
6. CI Max sheathing may be installed and left exposed without joint treatment. However, tape may be installed to reduce air leakage using aluminum or white foil tape that must have a flame spread of 25 or less and a smoke developed index of 450 or less.

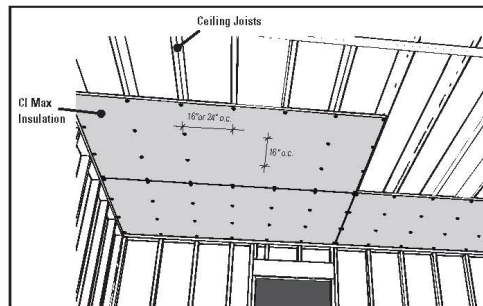


Figure 5. CI Max insulation installed over framed ceiling

CI Max Insulation for Exposed Interior Use

ICC (2012)	Flame Spread*	Smoke Development*
IBC Section 2603.5	4" thick (102 mm), 25 or less	4" thick (102 mm), 450 or less
IBC Section 2603		
IRC Section R316		

* Per ASTM E84

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.





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Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.



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Technical specifications as shown in this literature are intended to be used as general guidelines only. Please refer to the Safety Data Sheet and product label prior to using this product. The physical and chemical properties of CI MAX polyurethane foam listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the sales office nearest you for current information. **All Johns Manville products are sold subject to Johns Manville's standard Terms and Conditions, which includes a Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville standard Terms and Conditions or for information on other Johns Manville insulation and systems, visit www.jm.com/terms-conditions or call 800-654-3103.**

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