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2021 IECC RESIDENTIAL AIR BARRIER PLAN GUIDE

Based on the 2021 International
Energy Conservation Code



SHUMS CODA
ASSOCIATES



BUILDTank^{inc.}

AIR BARRIER PLAN GUIDE

Based on the Residential Provisions of the
2021 Edition of the International Energy Conservation Code

Minimizing air leakage, or uncontrolled air movement, in fenestrations and the building envelopes can significantly impact energy consumption and equipment efficiency. Energy Code § R402.4.1.1 identifies some of these common considerations - below are some of those items.

General Criteria



A continuous air barrier shall be installed in the building envelope. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.

Utility Shafts



Pipe chases, duct and flue shafts and utility penetrations that terminate to the exterior or unconditioned spaces shall be isolated, caulked, gasketed, or otherwise sealed with materials that allow for expansion, contraction, pressure differences, and mechanical vibration.

Thermal Separation



Thermal and air leakage sealing shall be provided between unconditioned and conditioned spaces. Insulated portions of the separation assembly shall be installed in accordance with Sections § R402.2.

Electrical Wiring



The air barrier shall be installed behind electrical boxes, wiring, and recessed fixtures to preserve installation and air barrier continuity. Alternatively, air-sealed boxes/fixtures shall be installed.

Plumbing Fixtures



All penetrations created by plumbing fixtures and components in the air barrier assembly shall be air sealed and insulation shall be installed around plumbing lines and fixtures in such manner that the required R-value/U-factor can be met. The air barrier shall separate the wall from the plumbing, shower or tub.

2021 IECC AIR BARRIERS & AIR SEALING

Air barriers can be a number of different products that limit air permeability within an assembly. **The tables below identify products and assemblies that are already identified as eligible air barriers in the code.** Remember, air barriers are systems! So it's not just about having a certain product in the assembly but being able to seal all joints, seams and penetrations to that product appropriately.

Are these the only products eligible to be used as air barriers? Not at all! Other products demonstrating compliance with **ASTM E2178 with an air permeability not greater than 0.004 cfm/ft² (0.02 L/s • m²) under a pressure differential of 0.3 inch water gauge (75 Pa)** can be air barriers as part of an assembly as well, just make sure that they are installed in the manner the manufacturer requires for use as an air barrier.

Air Barrier Materials (C402.5.1.3)

Material	Thickness	Material	Thickness
Plywood	Not less than 3/8"	Built up roof membrane	N/A
OSB	Not less than 3/8"	Modified bitumen roof membrane	N/A
Extruded Polystyrene (XPS)	Not less than 1/2"	Fully Adhered roof membrane	N/A
Foil-back Polyiso Board	Not less than 1/2"	Stucco, Parge or gypsum plater	Not less than 5/8"
Closed Cell Spray Foam	Min. density 1.5 pcf & 1.5" min. depth	Cast in place and precast concrete	N/A
Open Cell Spray Foam	Min. density of 0.4-1.5 pcf & 4.5" min. depth	Fully grouted concrete block masonry	N/A
Gypsum Board	Not less than 1/2"	Sheet Steel or Aluminum	N/A
Cement Board	Not less than 1/2"	Solid or Hollow Clay or Shale Masonry Units	N/A

Air Barrier Assemblies (C402.5.1.4)

- Concrete masonry walls coated with either one application of block filler or two applications of a paint or sealer coating.
- Masonry walls constructed of clay or shale masonry units with a nominal width of 4 inches (102 mm) or more.
- A Portland cement/sand parge, stucco or plaster not less than 1/2 inch (12.7 mm) in thickness.

AIR BARRIER PLAN GUIDE

What's the difference between an air barrier and a vapor retarder?!?!?

Air Barriers and Vapor Retarders are critical components in the building envelope, each serving distinct but complementary functions in managing moisture and air movement within structures.

Here's a breakdown of their roles, similarities, and differences:

Roles:

Air Barriers: Air barriers control the flow of air into and out of the building envelope. By creating a continuous seal around the building - air barriers prevent the loss of conditioned air; and reduce the risk of outside contaminants that impact indoor air quality.

Vapor Retarders: Also referred to as vapor barriers, their primary function is to control the diffusion of water vapor through the walls, ceiling, and floor assemblies. These materials help to prevent moisture condensation within the insulation or hidden structural spaces that can result in structural damage or mold growth.

Similarities

Moisture Control: Both air barriers and vapor retarders contribute to moisture control in buildings. Air barriers limit the amount of humid air that can infiltrate or exfiltrate the building, while vapor retarders prevent water moisture from diffusing into sensitive building materials.

Energy Efficiency: Each plays a role in improving energy efficiency. Air barriers reduce the energy needed to re-heat or re-cool the building by minimizing uncontrolled air leakage. Vapor retarders help maintain the effectiveness of insulation by preventing moisture from compromising its thermal resistance.

Differences

Material Properties: Vapor retarders are made from materials like polyethylene sheets, foil-backed paper, or special paints that resist the diffusion of liquid water and water vapor. Air barriers, on the other hand, are made from assemblies of materials that resist air passage.

Placement and Function: The placement of air barriers is focused on creating a seal that encapsulates the entire building envelope and all penetrations on all 6 sides. Vapor retarders are placed on the interior of the building assembly where they can best prevent the diffusion of moisture due to vapor pressure differences.

IECC CODE REFERENCES

- § 402.1.1 - Vapor retarder
- § R402.4.1.1 - Air barrier installation
- § R103.2.1 - Thermal envelope depiction



AIR BARRIER PLAN GUIDE

How do I use this Plan Submittal Tool?

R103.2 of the 2021 IECC requires **air sealing details to be provided in your plan** set for review and use during inspections. Table R402.4.1.1 identifies and lists the areas where these details need to be provided. In the pages below you will use boxes to fill in your air barrier detail information. You can provide drawings where needed and notes to explain how you will meet the requirements.

Step 1: Figure out which details are needed for your project.

Every item in Table 402.4.1.1 is listed with a box, should you need to provide them. Some of these may not be needed for your project (for instance, you won't need to provide a cantilevered floor air barrier detail if you don't have any cantilevered floors). Your plans reviewer or inspector can help you **figure out the boxes that need a detail** and **"X" out the ones you don't need to worry about**.

Step 2: Start drawing your details and providing your notes.

Use the empty boxes provided to make a sketch of the assembly you need to provide. Don't forget to clearly **label what the air barrier is in the assembly** and areas you intent to caulk or seal. Use notes to **describe what you'll do at joints, seams and penetrations**. Try to be as clear as possible about what products you'll be using, refer to the details and notes in the boxes on the left for examples.

Still having trouble putting together your details?

We've got you covered with some **sample details and notes** for you to use or model your own sketches on!



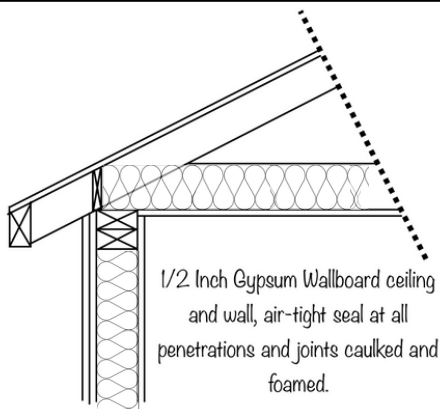
AIR BARRIER SUBMITTAL SHEETS

Use these examples (LEFT) or draw/write a detail specific to your project for the same purpose (RIGHT).

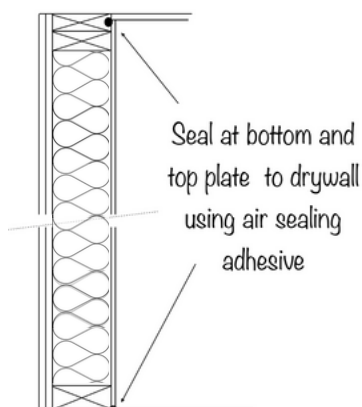
General Continuity

Durably seal thermal envelope to limit air infiltration using the air-tight drywall method. All penetrations to the drywall must be gasketed, sealed and caulked, weather-stripped or otherwise sealed with an air barrier material. Treat all joints seams and penetrations.

Ceiling/Attic

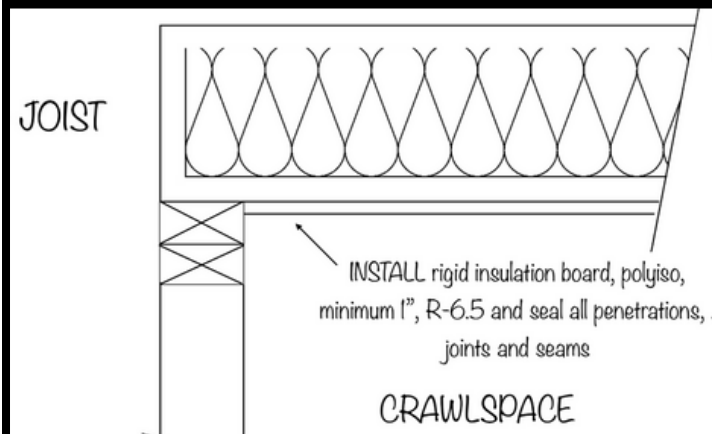


Walls

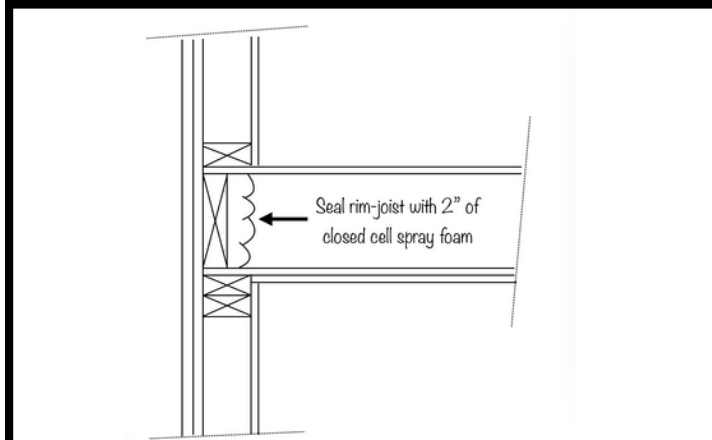


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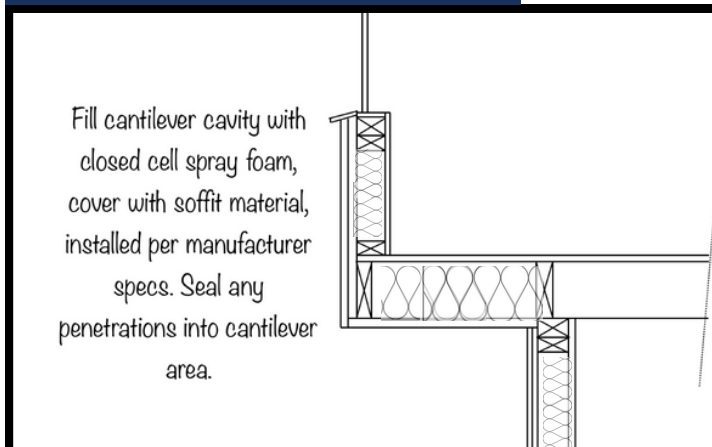
Floors



Rim Joist

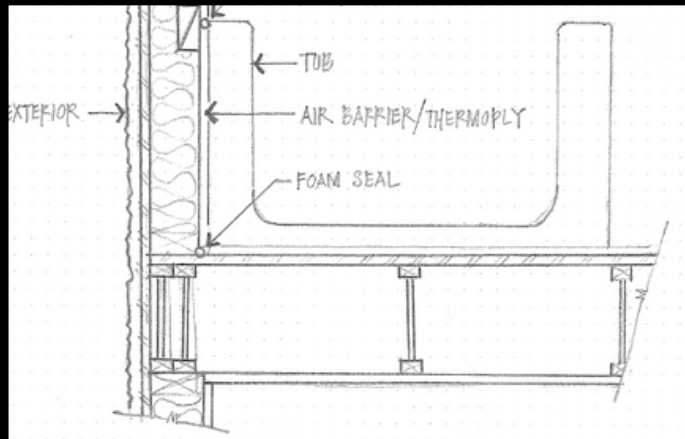


Cantilevered Floor

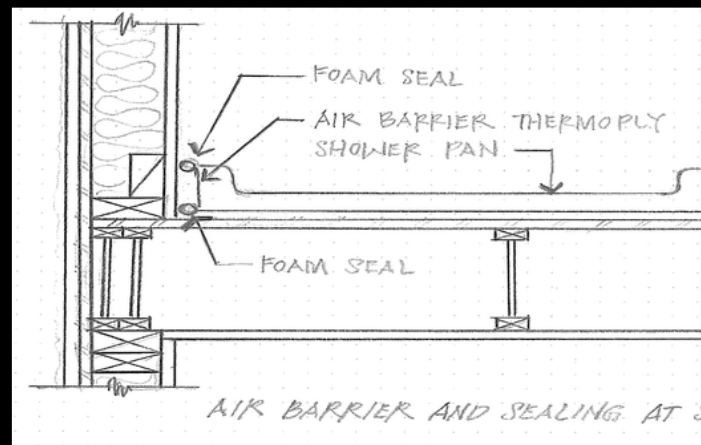


AIR BARRIER SUBMITTAL SHEETS

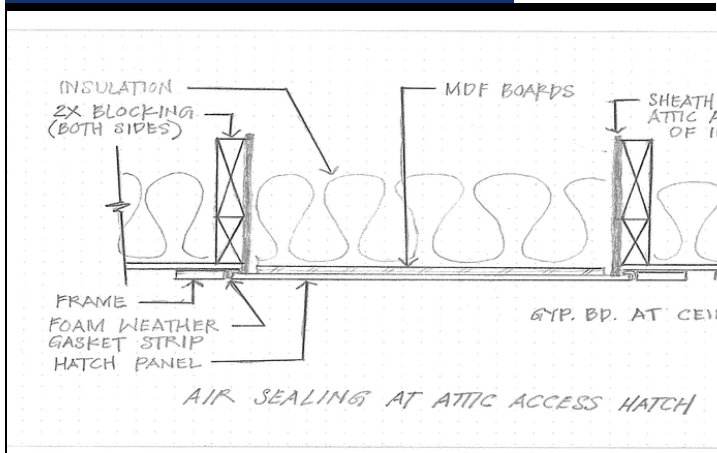
Tub



Shower

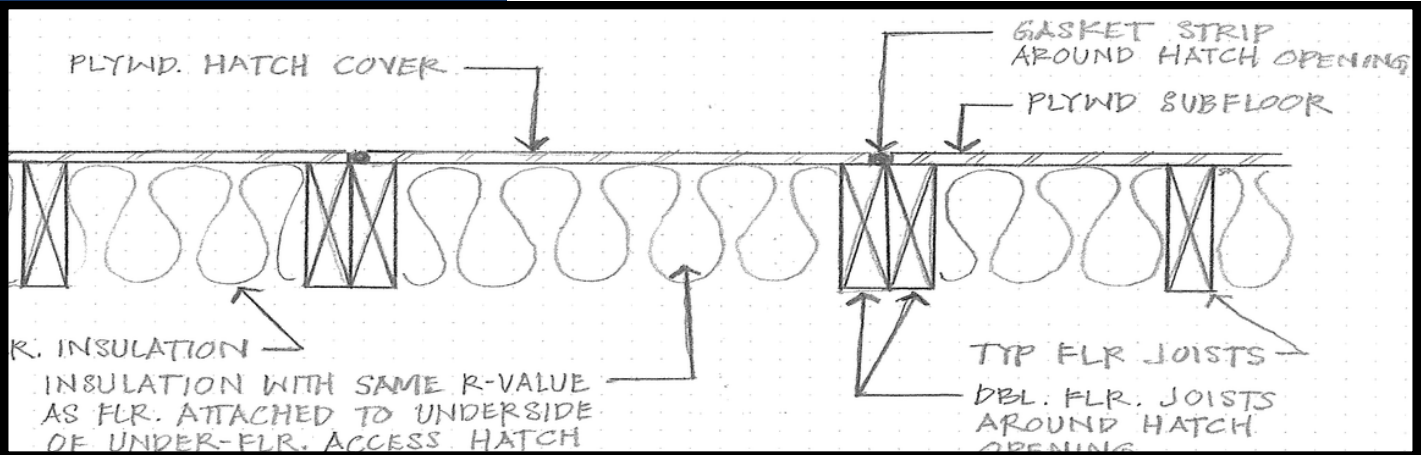


Attic Access

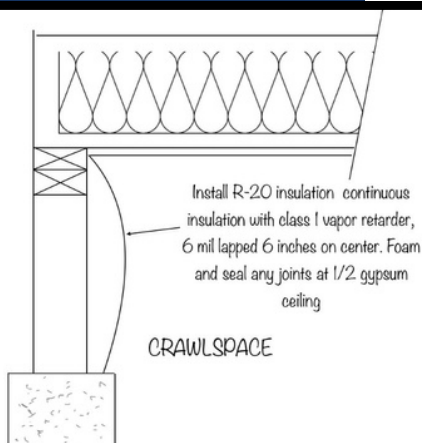


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Floor/Crawlspace Access

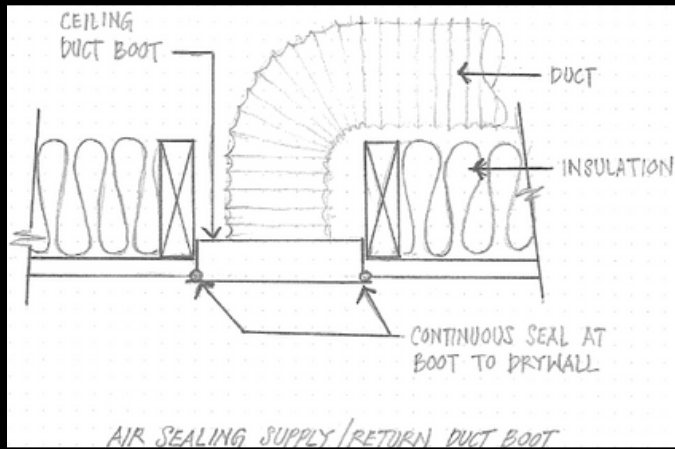


Crawlspace walls

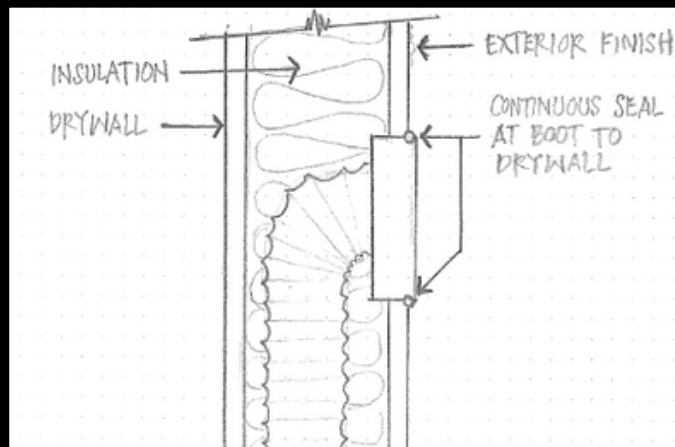


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HVAC Boot (Horizontal)



HVAC Wall Boot

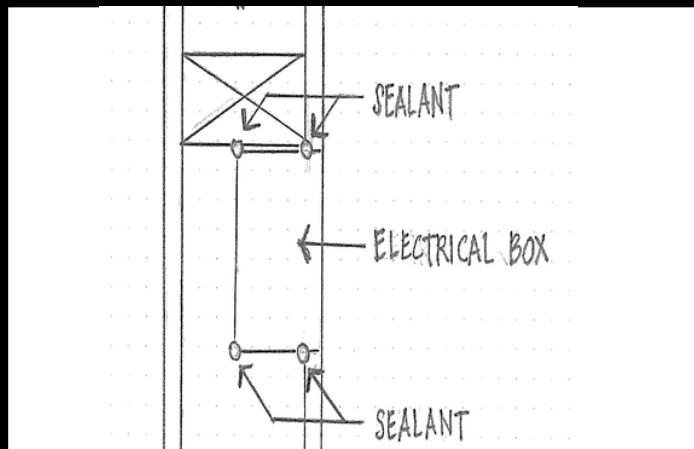


Windows, Skylights and Doors

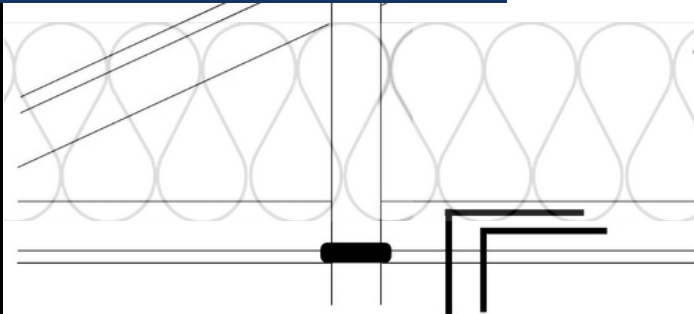
All windows, doors and skylights are to be installed tight to framed opening. Any gaps shall be sealed with low expansive foam sealant in accordance with manufacturer specifications

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Electrical Boxes



Plumbing/Wiring Penetrations



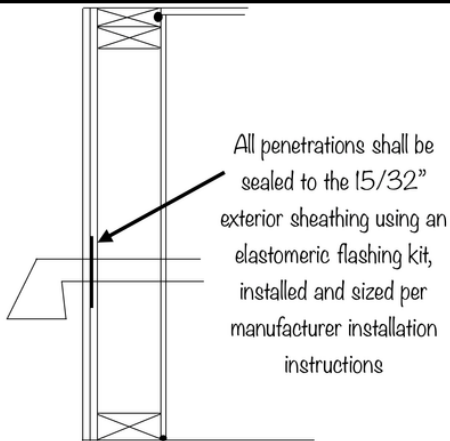
Seal all penetrations for electrical wire and plumbing pipe with caulk and canned foam. Penetration hole not to exceed penetration size by more than 1/4"

Recessed Lighting

All recessed cans located within the thermal envelope shall be IC-rated and caulked between the housing and the gypsum ceiling.

AIR BARRIER SUBMITTAL SHEETS

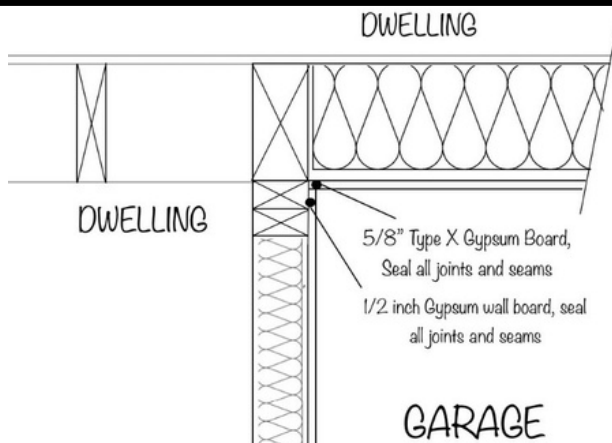
Shafts and Penetrations



Fire Sprinklers

Fire Sprinkler escutcheons and fire sprinkler covers shall be fit tight to drywall, installed per manufacturer instructions. No caulk or sealant will be used at this penetration.

Garage-Dwelling Separation

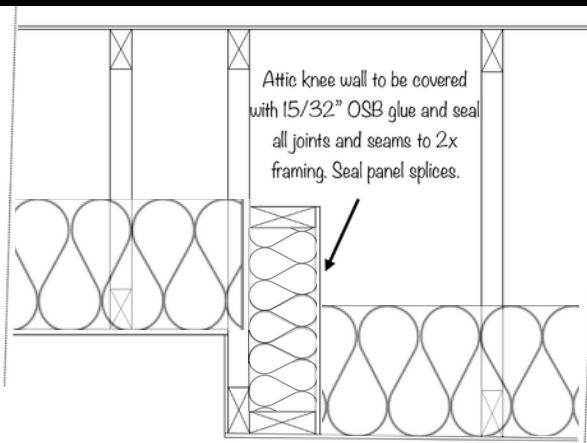


AIR BARRIER SUBMITTAL SHEETS

Shafts and Penetrations

Narrow cavities, less than 1" in width, shall be air-sealed using canned spray foam sealant applied in accordance with the manufacturer specifications. Cavities greater than 1" shall be insulated.

Knee Walls



Miscellaneous Details