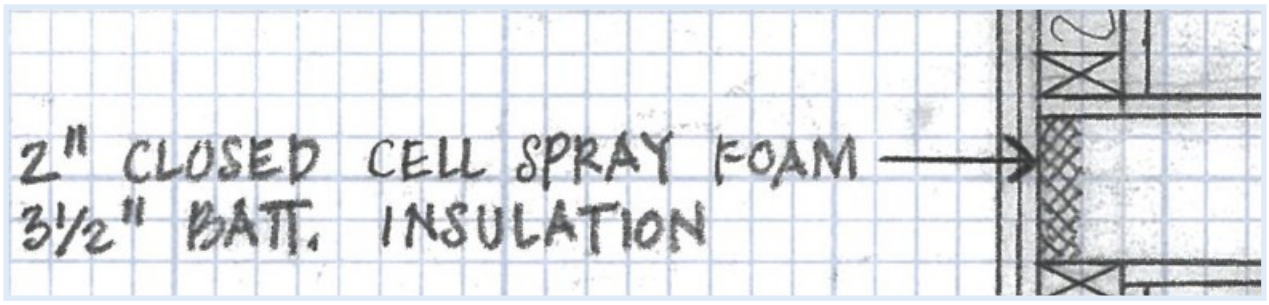
Residential Air Barriers for Designers and Plan Reviewers

What are the requirements?

How should it be shown on the plans?

What should I be looking for?

What additional air barrier information is required by the state?



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Air Barriers for Designers and Plan Reviewers

Air Leakage / Air Barrier Requirements

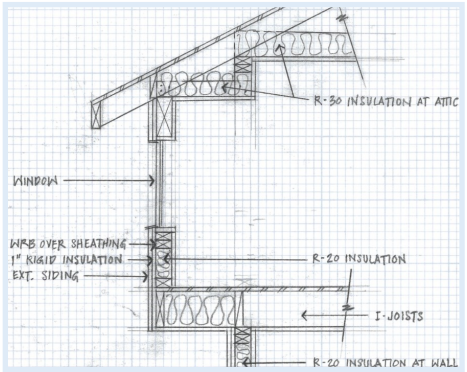
R103.2

Required to be placed on the plans

- Air sealing details

R402.4 Air Leakage

- Limit air leakage with the thermal envelope assembly, including air barriers.
- Sealing methods must account for expansion and contraction.
- Components of the thermal envelope must comply with Table R402.4.1.1.
- Footnote a - Inspection of log walls shall be in accordance with ICC 400.
- Footnote b - Air barrier and insulation full enclosure is not required in unconditioned/ventilated attic spaces and at rim joints.
- Testing must be performed in the locations listed in R402.4.1.5 in accordance with R402.4.1.2. Locations not listed in R402.4.1.5 are required to comply with Table R402.4.1.1 and the Thermal Bypass Inspection Checklist.
- When testing the air leakage rate can not exceed the values in R402.4.1.3.



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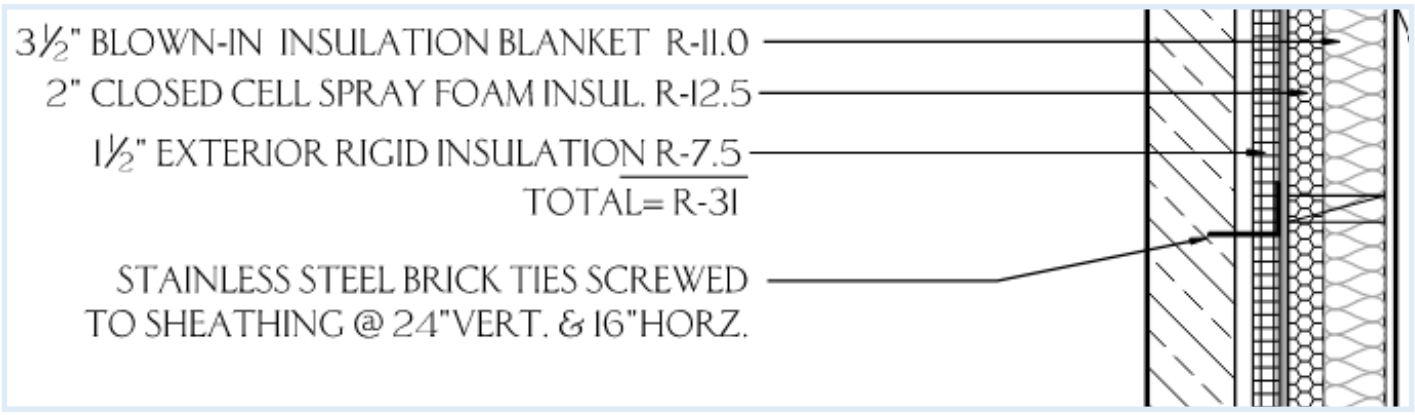
Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - General Requirements

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

Common Materials Used

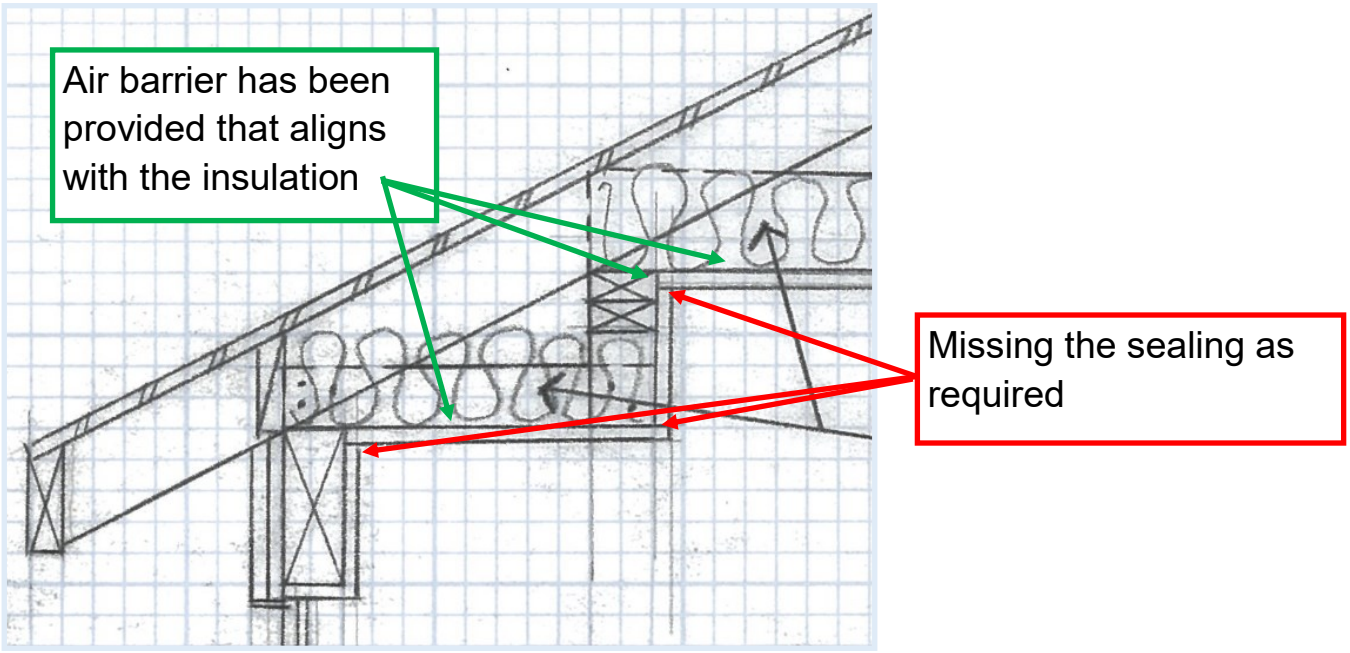
- Continuous rigid insulation on the exterior
- House wrap installed as tested for air barrier
- Zip Panels
- Drywall

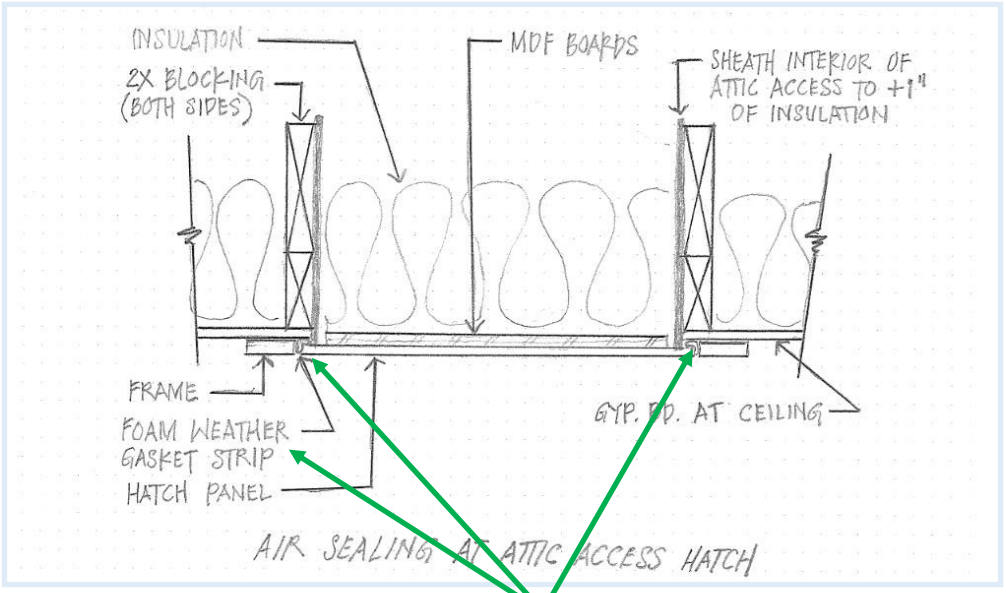


Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Ceiling/Attic

- The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.
- Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.





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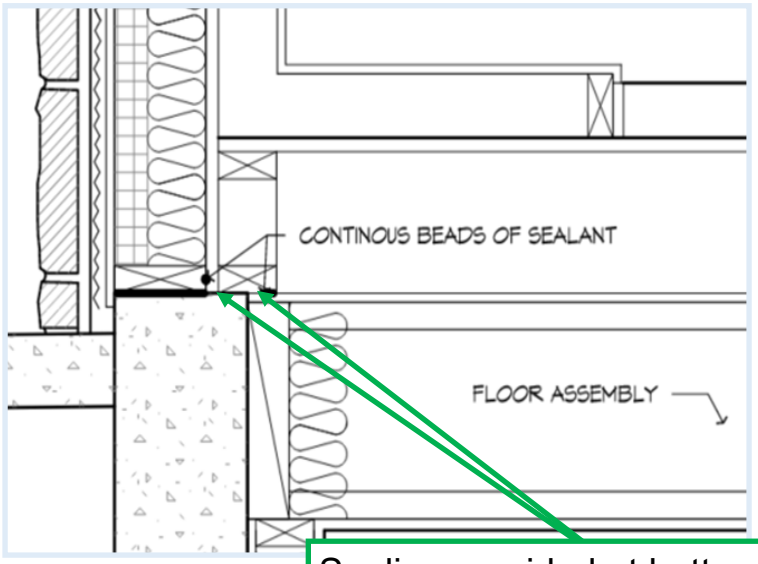
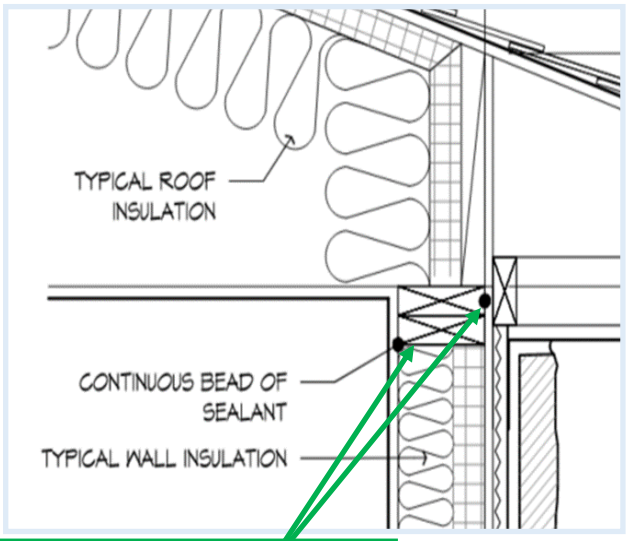
Air Barriers for Designers and Plan Reviewers

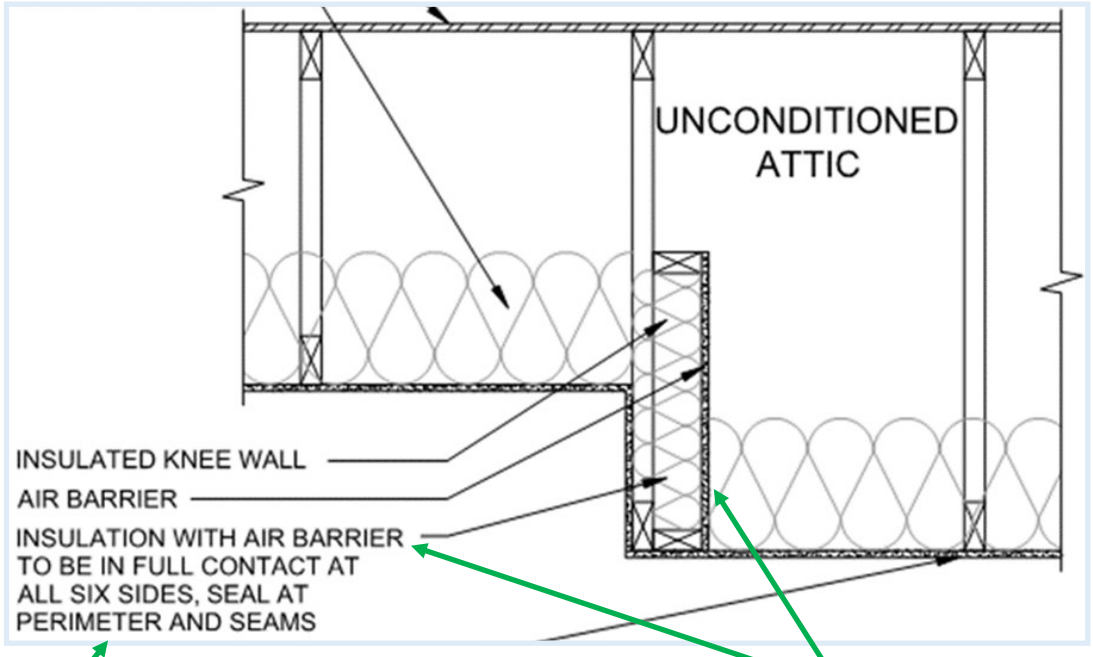
Table R402.4.1.1 - Walls

- The junction of the foundation and sill plate shall be sealed.
- The junction of the top plate and the top of exterior walls shall be sealed.
- Knee walls shall be sealed.





Sealing provided at bottom (sill) plate and at top plate

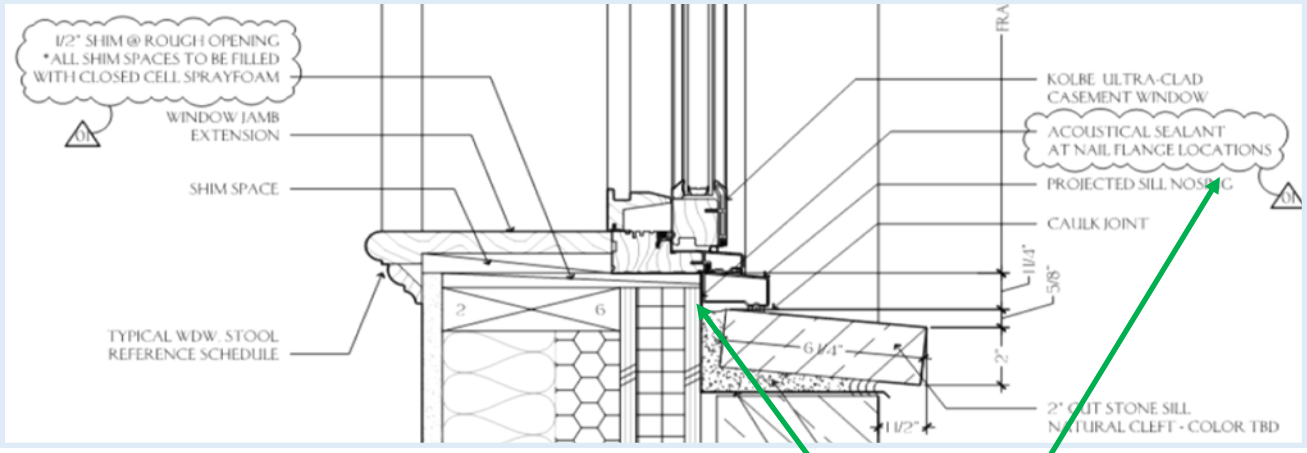


Air sealing is called out and an air barrier is provided and called out

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Windows, Skylights, and Doors

- The space between framing and skylights, and the jambs of windows and doors, shall be sealed.
- Fast expanding foam can not be used for sealing these locations



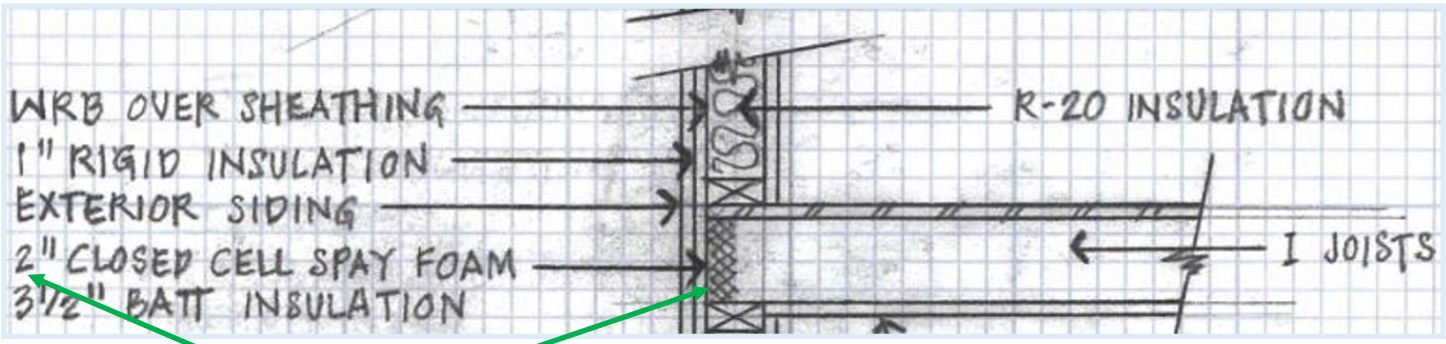
- Can be shown as either part of a window detail
- More likely to be in the form of a note on the plans

Openings between window and door assemblies and their respective jambs and framing shall be sealed and insulated with sprayed foam with a thermal resistance of R-3 per-inch minimum.

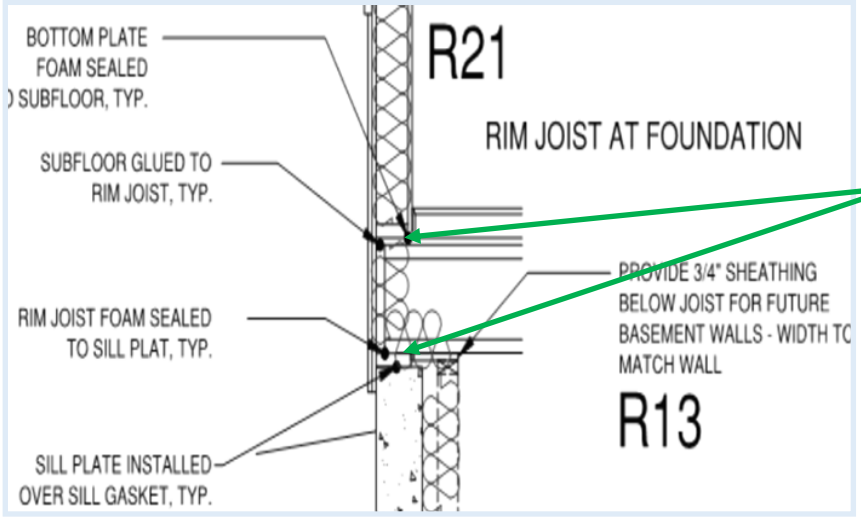
Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Rim Joists

- Rim joists shall include an exterior air barrier.
- The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.



- Spray foam can be considered an air barrier if installed to a certain thickness.
  - Open cell spray foam 4.5” thickness– unless noted otherwise by manufacturer information
  - Closed cell spray foam 1.5” thickness– unless noted otherwise by manufacturer information
- Closed cell spray foam can be both an air barrier and part of the above grade wall insulation R-value.



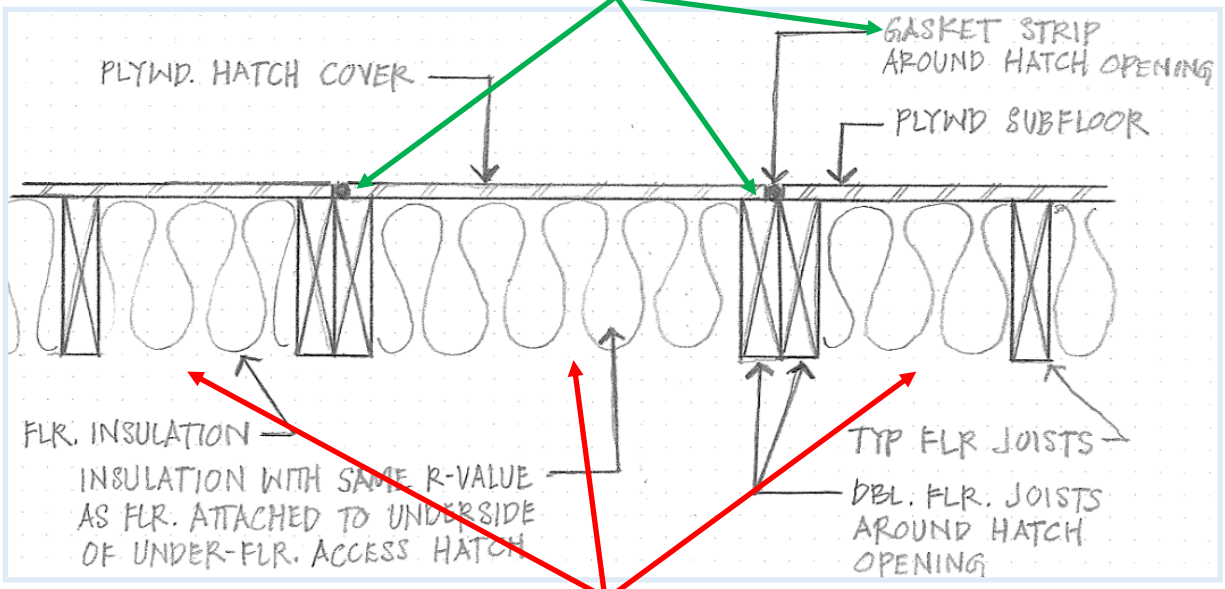
Calls out for the sill plate and subfloor to be sealed

Air Barriers for Designers and Plan Reviewers

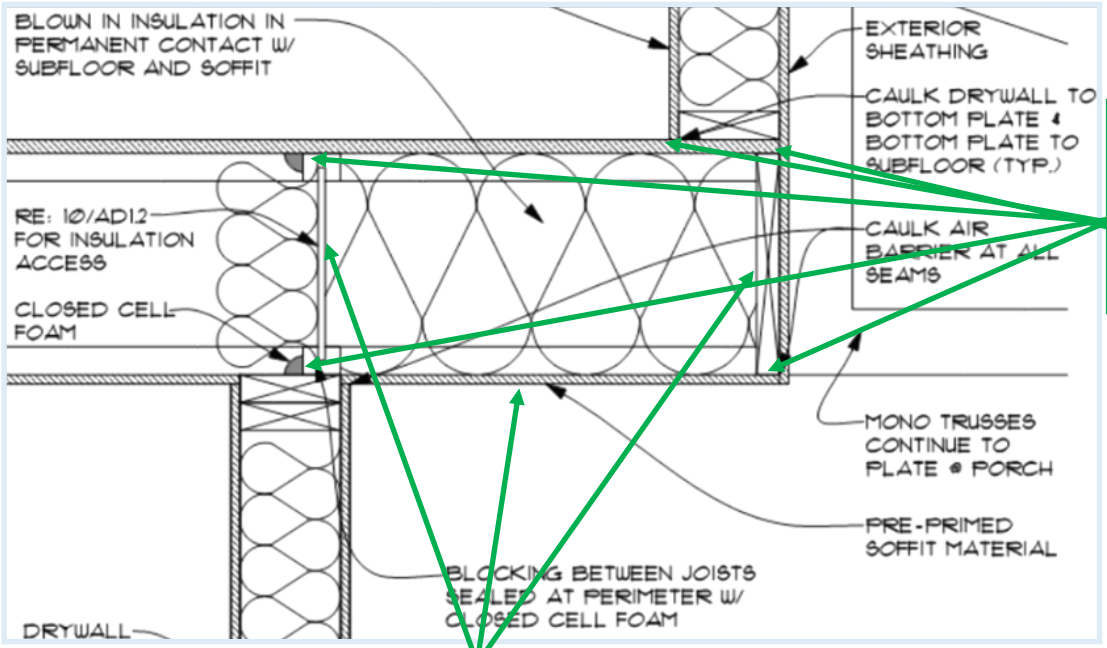
Table R402.4.1.1 - Floors, including cantilevered floors and floors above garages

- The air barrier shall be installed at any exposed edge of insulation.

Floor hatch has sealing with a gasket



Air barrier is missing to separate the unconditioned space from the conditioned with it in alignment of the insulation.



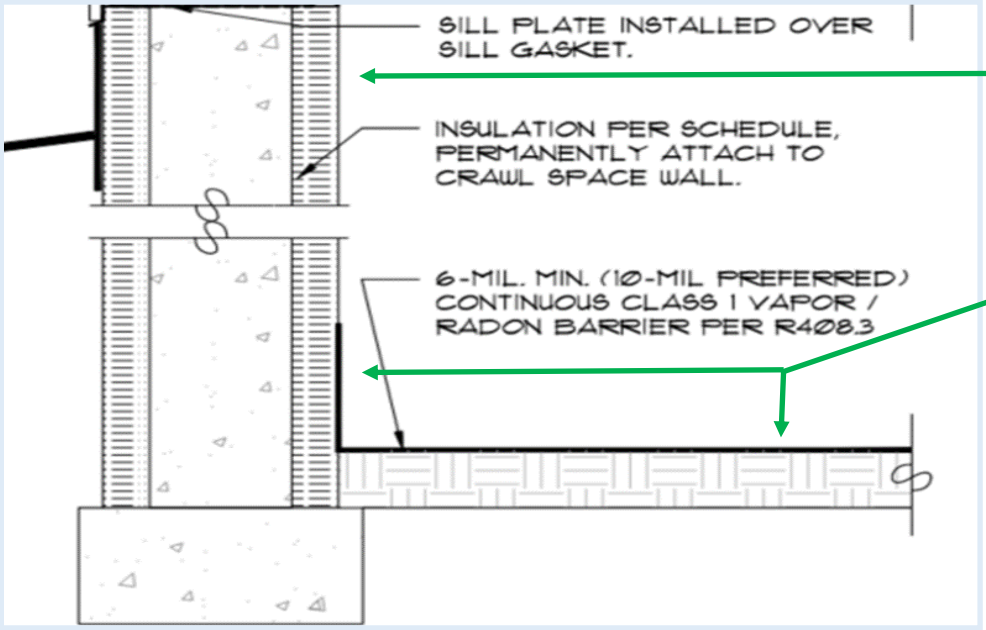
Air sealing has been provided at the correct locations

Air barrier has been provided in correct locations

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Basement, Crawl Space, and Slab Foundation

- Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder/air barrier in accordance with Section R402.2.10.
- Penetrations through concrete foundation walls and slabs shall be air sealed.
- Class 1 vapor retarders shall not be used as an air barrier on below-grade walls and shall be installed in accordance with Section R702.7 of the International Residential Code.



Walls are insulated

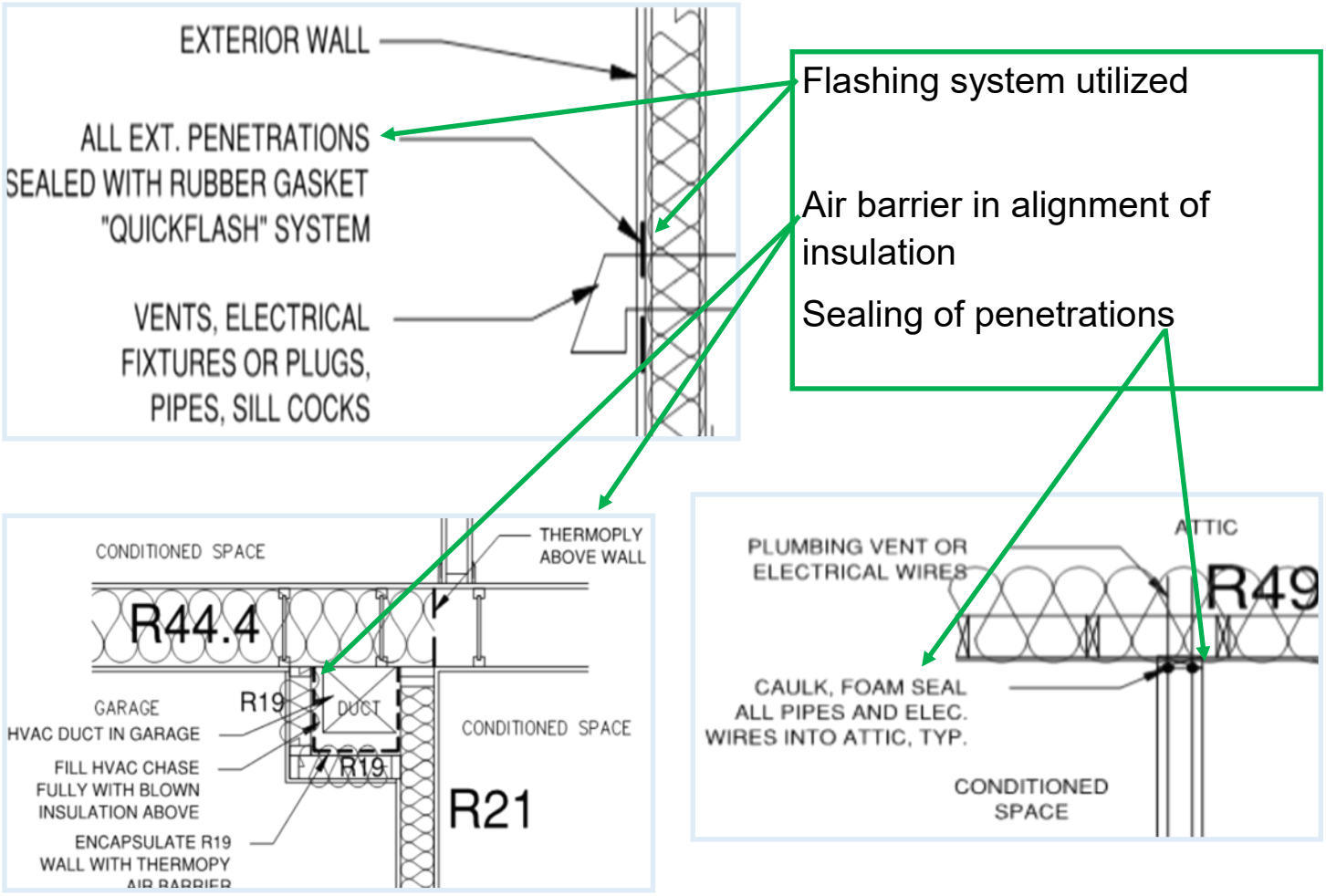
Vapor retarder provided and shown going up the wall a minimum 6”.

Either a note or detail might be provided for the new requirement of sealing of penetrations through slab or foundation wall.

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Shafts, Penetrations

- Duct and flue shafts to exterior or unconditioned space shall be sealed.
- Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.



The type of sealant utilized must be appropriate for it's location.

If located on the exterior of the building is it able to be used when exposed to the weather, UV rays, and ect.

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Narrow Cavities

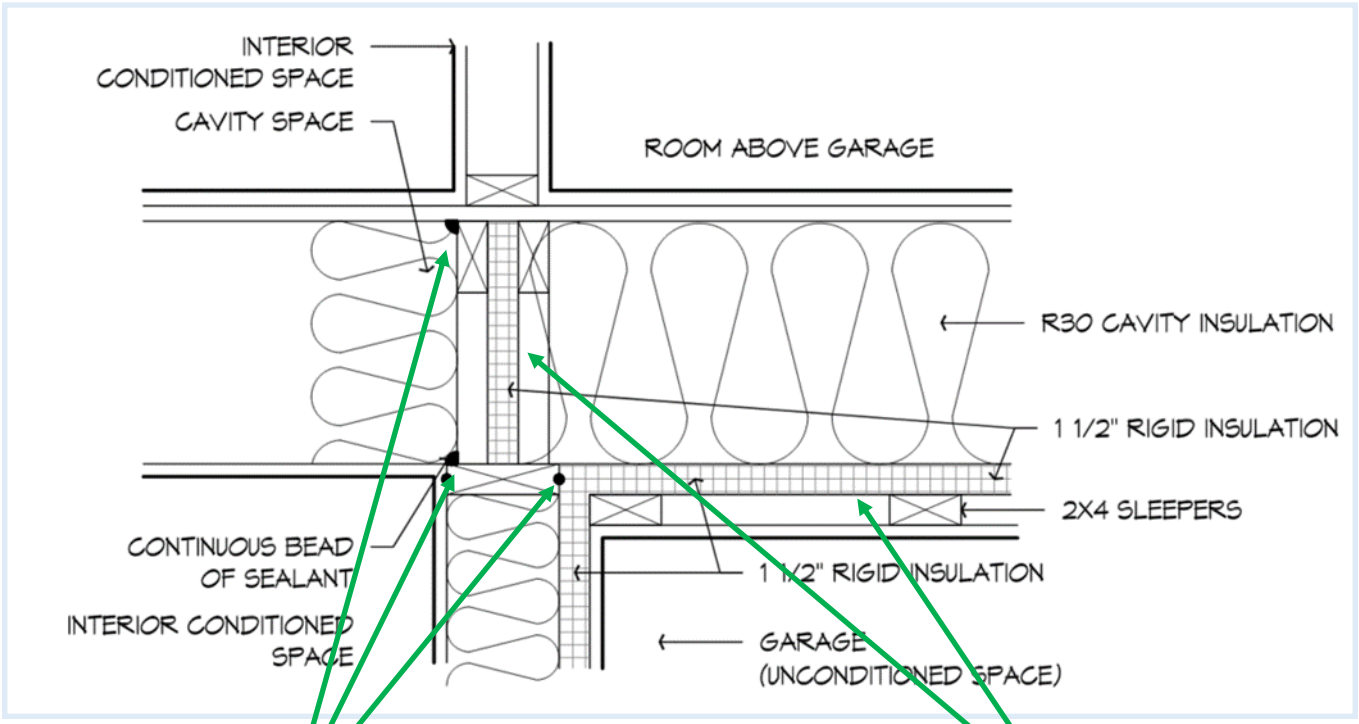
- Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed.

- This is a new requirement in the 2021 IECC
- This may be demonstrated with a note on the plans
- The image below demonstrates the intent of this requirement to seal those locations

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Garage Separation

- Air sealing shall be provided between the garage and conditioned spaces



Sealing was called out to separate the garage area from the dwelling units

Air barrier is called out to separate the garage area from the dwelling units

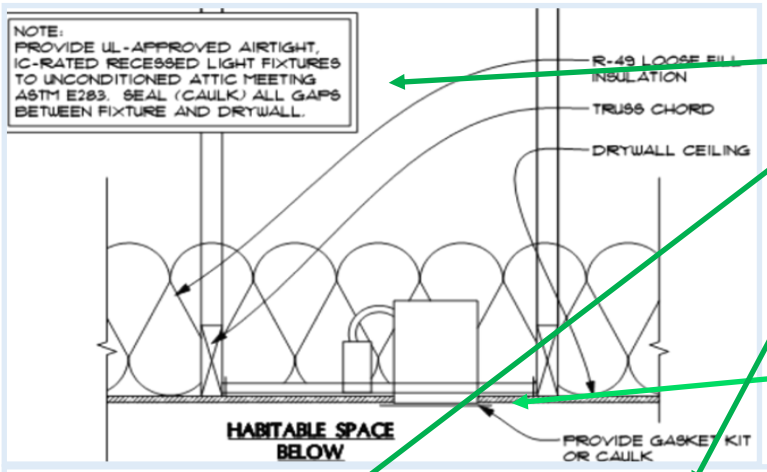
Air Barriers for Designers and Plan Reviewers

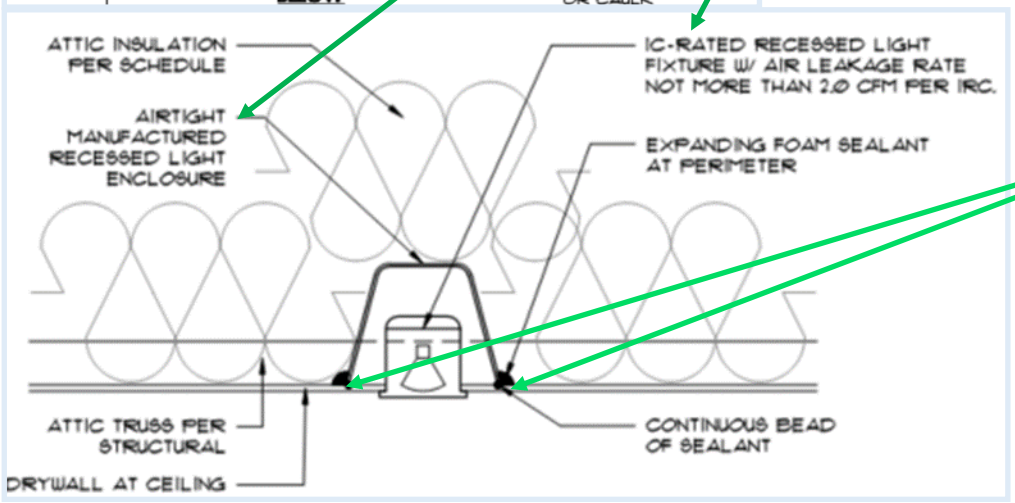
Table R402.4.1.1 - Recessed Lighting

- Recessed light fixtures installed in the building thermal envelope shall be air sealed in accordance with Section R402.4.5.

Section R402.4.5

- IC-rated (In Contact with insulation)
- Air leakage rate maximum of 2.0 cfm
- Sealing with gasket or caulking between housing and interior wall or ceiling





IC– rated and meets the air leakage rating for the enclosure

Recessed lighting sealed, or gasketed at the finished surface

Can also be demonstrated by a note

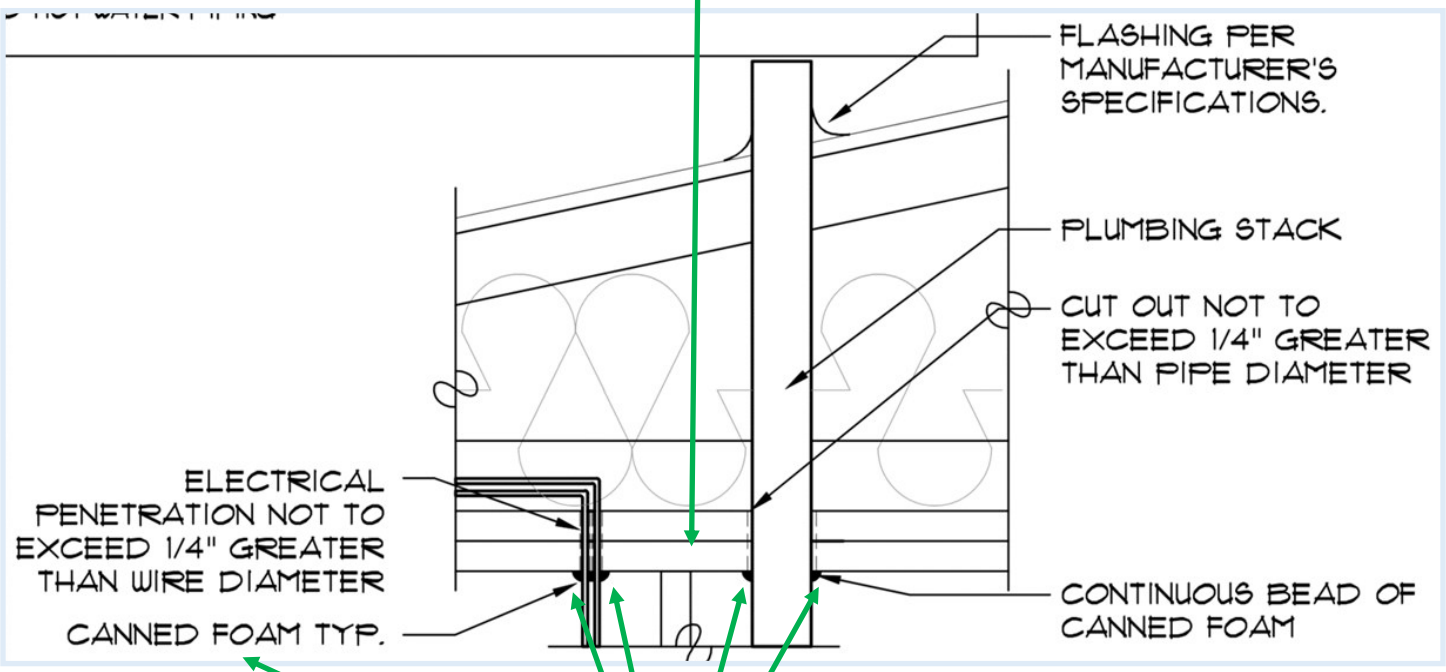
9. RECESSED LIGHTING INSTALLED IN THE THERMAL ENVELOPE SHALL BE SEALED WITH A GASKET OR CAULK BETWEEN THE HOUSING AND THE INTERIOR WALL OR CEILING COVERING, BE IC-RATED AND LABELED AS HAVING AN AIR LEAKAGE RATE NOT MORE THAN 2.0 CFM PER IRC.

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Plumbing, Wiring, and Other Obstructions

- All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed.

Air barrier provided—the drywall



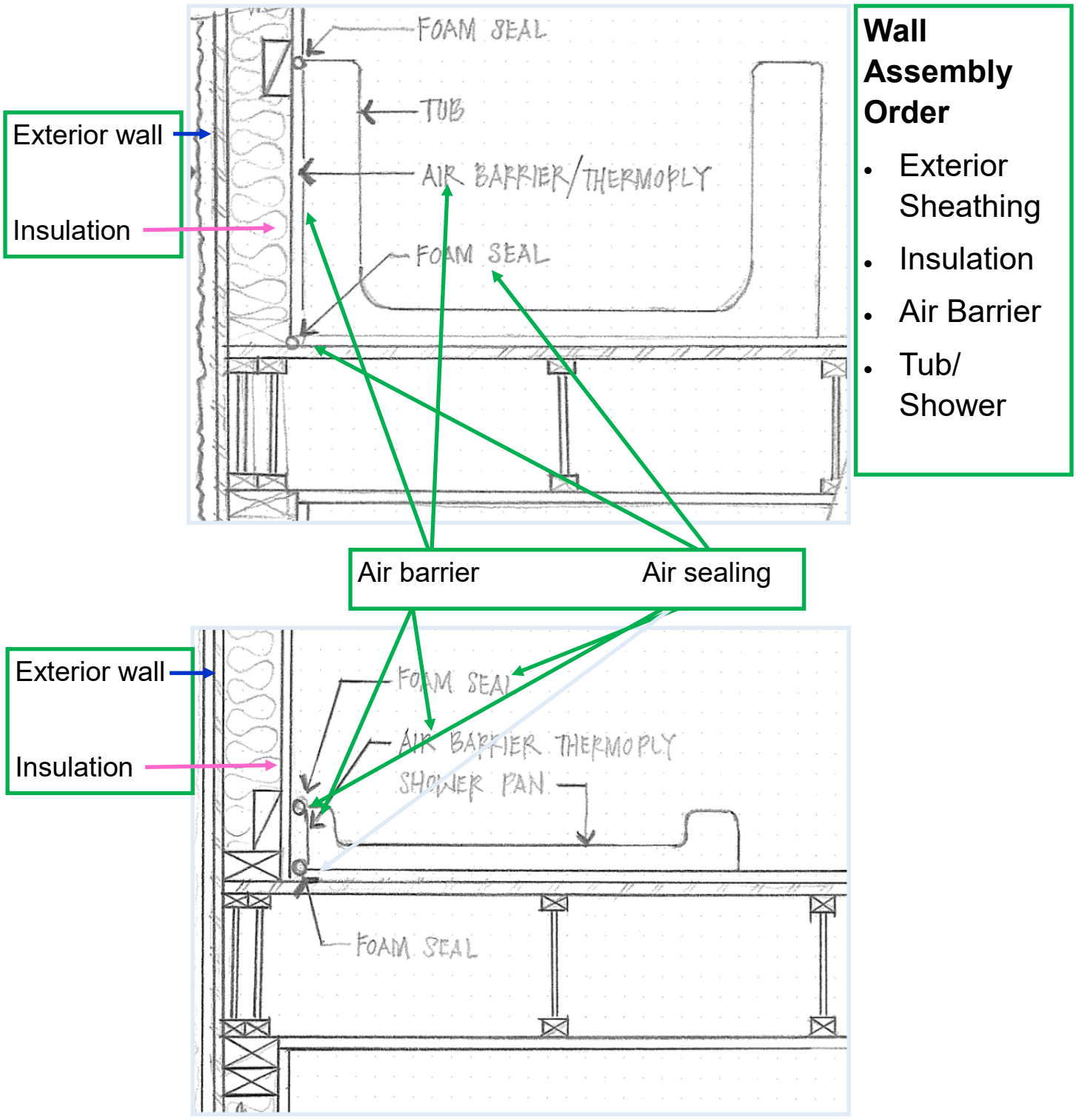
Sealing of plumbing and wiring the penetrate the drywall

Shown as a detail with notes

Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Shower/Tub on exterior walls

- The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.



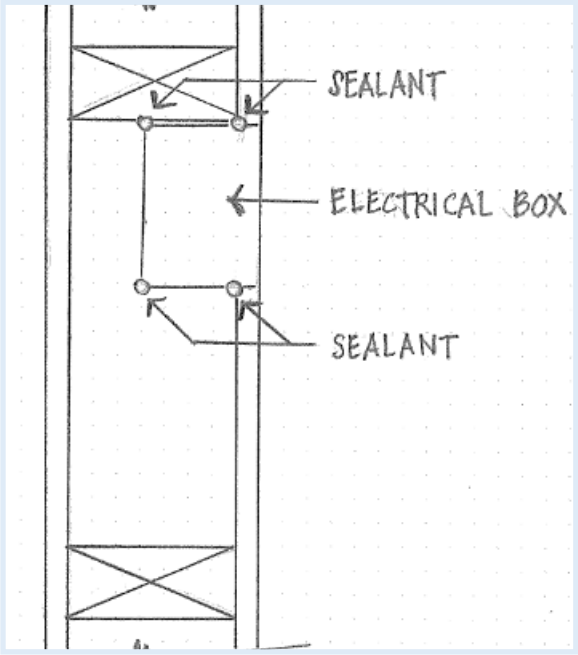
Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Electrical/Phone Boxes on exterior walls

- The air barrier shall be installed behind electrical and communication boxes. Alternatively, air-sealed boxes shall be installed.
- When an air seal box is utilized it must comply with R402.4.6

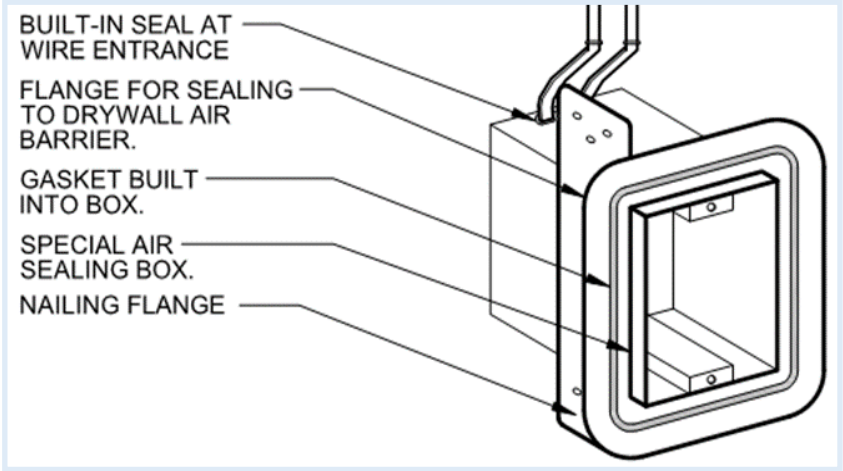
R402.4.6 Electrical and communication outlet boxes

- Tested in accordance with NEMA OS 4
- Air leakage rate 2.0 cfm maximum
- Labeled NEMA OS 4 or OS 4



This detail is showing self sealing of electrical box.

It must have an air barrier behind the box or use an air sealed box in accordance with R402.4.6



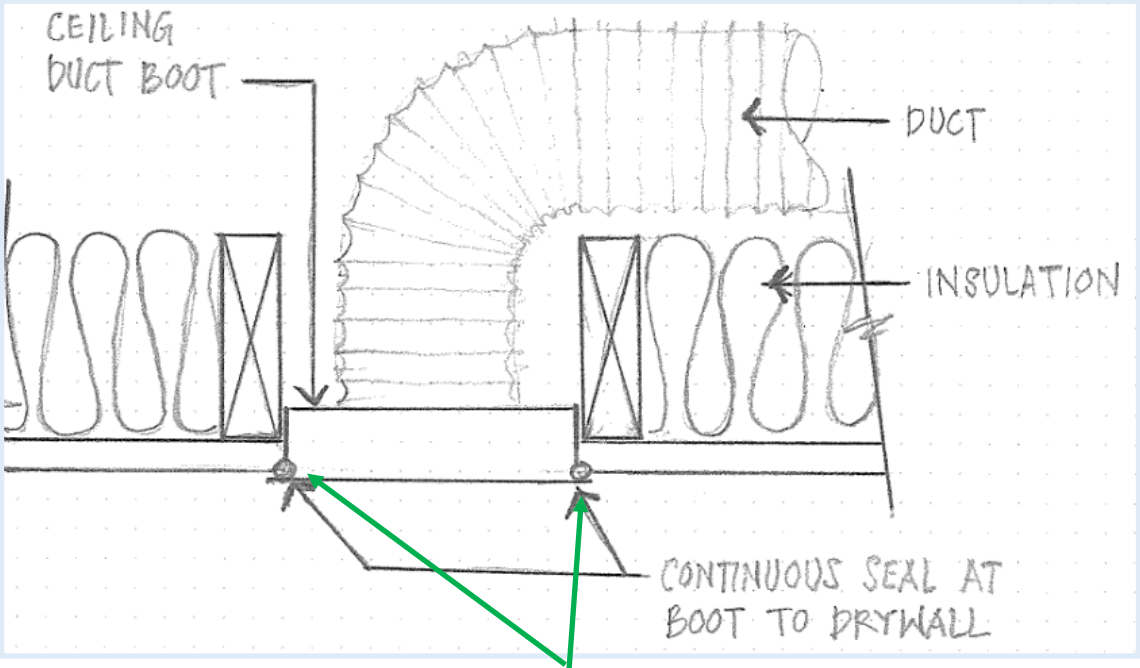
This detail is showing an air-sealed box.

It would need to be tested and labeled as NEMA OS 4 compliant - Probably just noted, similar to what is shown for recessed lighting requirements.

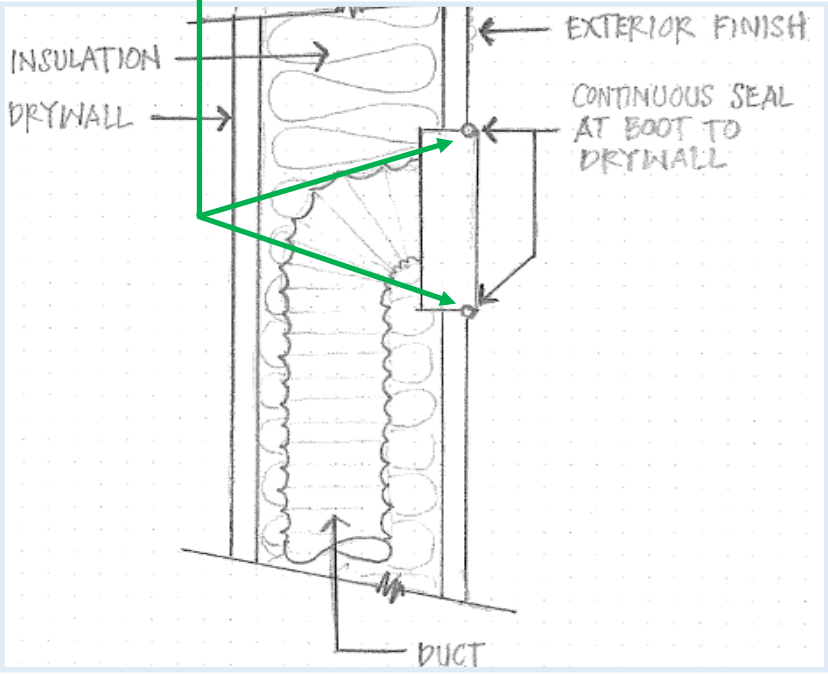
Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - HVAC Register Boots

- HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.



Sealing at register to surface



Air Barriers for Designers and Plan Reviewers

Table R402.4.1.1 - Concealed Sprinklers

- Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

No standardized detail can be provided by the designer. It must come from the manufacturer of the concealed sprinkler head. As a plans examiner or architect/designer a request should be made to the manufacturer for the correct detail for air sealing