

Insulation grading for code inspections

Brad Smith - Energy Code Specialist

2015 IECC Code:

Section C402.2 Specific insulation requirements is hereby amended by adding a second paragraph to read as follows:

“Insulation installation requirements (Mandatory). In addition to the requirements of Section C402.1, insulation shall meet the specific requirements of Sections C402.2.1 through C402.2.6. All insulation shall be installed to meet Residential Energy Services Network (RESNET) Grade I standard.

Exception: RESNET Grade II is acceptable for cavity insulation in exterior walls that include continuous rigid insulating sheathing and/or insulated siding with a minimum R-value of 5, and rim joists.”

2018 IECC Code:

Section C402.2 Specific building thermal envelope insulation requirements (Prescriptive)

All insulation shall be installed to meet Residential Energy Services Network (RESNET) Grade I standard.

and...

C402.2.4 Slabs-on-grade perimeter insulation (Mandatory)

R402.2.10 Slab-on-grade floors (Mandatory)

RESNET Grade 1 Installation requires that insulation material should uniformly fill wall cavities, filling each cavity from side to side and top to bottom, without substantial gaps or voids around obstructions. Batt insulation should be cut to fit around any wiring or piping installed in the wall cavities.

~ Minimum General Requirements ~

1. Installed to manufacturers' recommendations and industry standards.
2. Integral to and in substantial and permanent contact with the primary air barrier.
3. No air spaces between different insulation types or systems.
4. Installed to the required density and thickness necessary to achieve the required R-value.
5. Fill around obstructions including framing, blocking, wiring, pipes, etc. without substantial gaps or voids.

~ Minimum Specific Requirements ~

1. Edges and joints durably taped/air sealed.
2. Edges tightly fitted against one another without substantial gaps.
3. Carefully fitted and durably taped/air sealed around obstructions.
4. With two or more layers - the joints must be staggered. Only the joints of the exterior layer need to be durably taped/air sealed.
5. Tape or air seal joints and have the proper approvals if used as a Weather Resistive Barrier (WRB)

IECC Table(s) C402.1.5 & R402.1.2

Footnotes C & L (respectively): Class 1 vapor retarders shall not be installed on the interior of framed walls where exterior ci value is less than R7.5.



~ Minimum Specific Requirements ~

1. Insulation must fit the cavity being insulated side to side, top to bottom.
2. Enclosed on all six sides. (*attics above ceilings don't require air barrier to exterior side*)
3. Faced batts must be stapled to the face of the studs or side stapled to the studs with no buckling. The tabs can be left unstapled. Faced batt products without tabs and friction fit products don't need to be stapled in vertical walls.
4. When side stapled, compression is permitted along edges to the depth of the stapling tab.
5. Closely fit insulation around obstructions like framing, blocking, wiring, pipes, etc. to avoid substantial gaps, voids or compression.



~ Minimum Specific Requirements ~

1. Containment fabric or system that is side stapled - can't be stapled more than ½ inch from the face of the stud.
2. Insulation must be rolled or trimmed to allow installation of the interior finish material. (wet cellulose or cellulose blown with adhesive)
3. Fill the cavity side to side, and top to bottom.
4. Installed around all obstructions including framing, blocking, wiring, pipes, etc. to avoid substantial gaps, voids or compression.
5. Density sufficient to prevent settling.
6. Enclosed on all six sides. (*attics above ceilings don't require air barrier to exterior side*)
7. Attic rulers installed in accordance with the codes.
* (one every 300 sq ft facing the attic access opening)



courtesy energyLogic

~ Minimum Specific Requirements ~

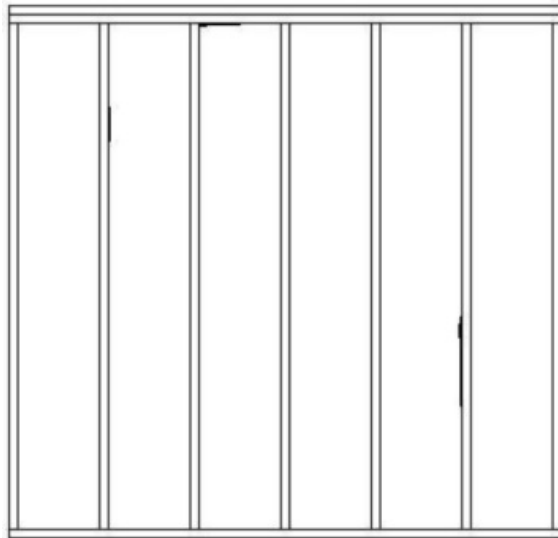
1. Well-bonded to the substrate, including framing and sheathing.
2. Permitted as the air barrier - When installed at the minimum thickness to be air impermeable and in-contact with the substrate.
 1. 1.5 inches closed cell foam
 2. 5.5" Inches open cell foam.
3. Trim excess to allow installation and contact with interior finish.
4. Fill the cavity to within ½ inch from the face of the studs.

Exception: When the required R-Value is met using a thickness that is less than the cavity depth.

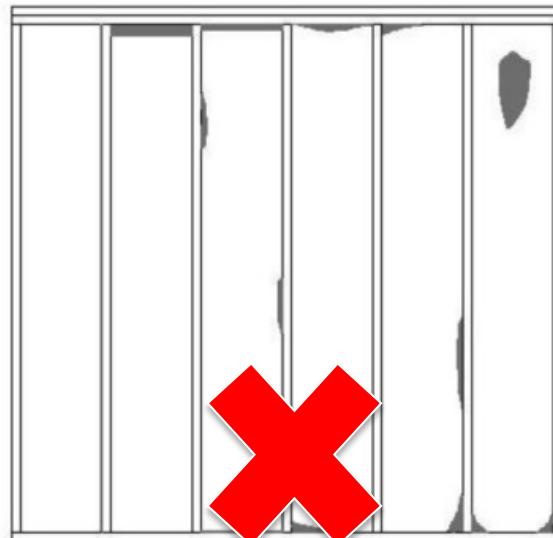


Examples

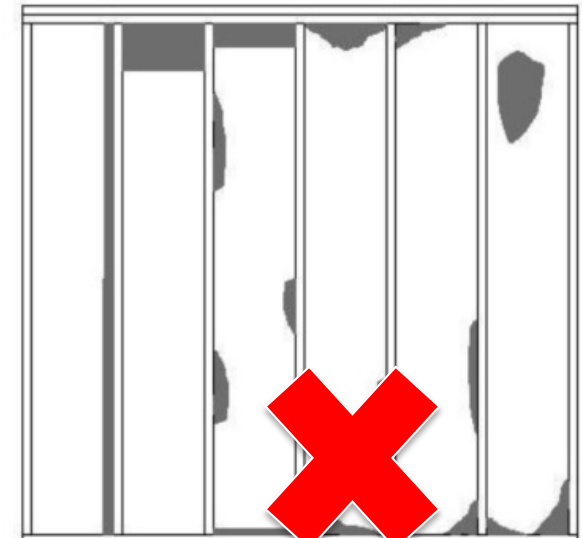
Can't have more than 2% of the total insulated area compressed, or contain gaps or voids in the insulation.



Grade I: Almost no gaps



Grade II: Up to 2%

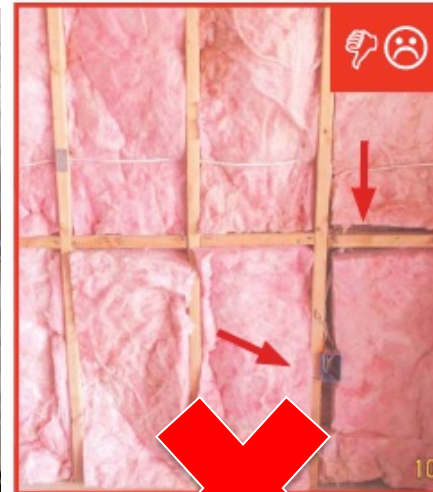


Grade III: 2% - 5%

RESNET protocol for the effect of missing insulation on installation grade
Diagrams from the HERS Standards

Examples

Can't have more than 2% of the total insulated area compressed, or contain gaps or voids in the insulation.

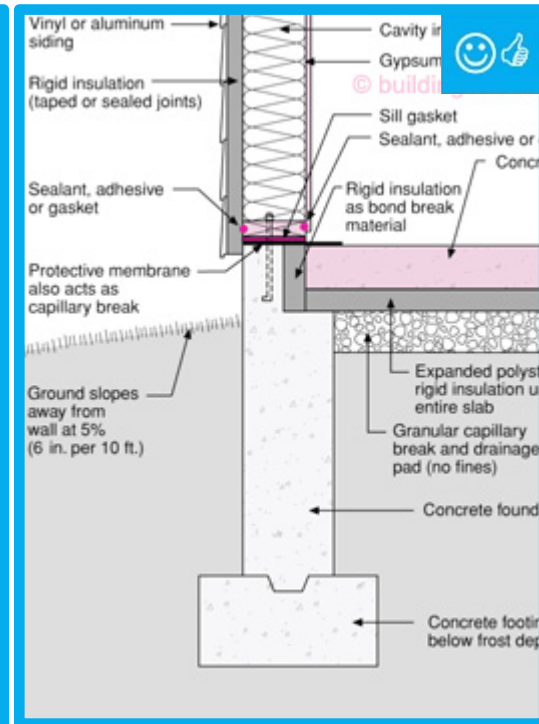
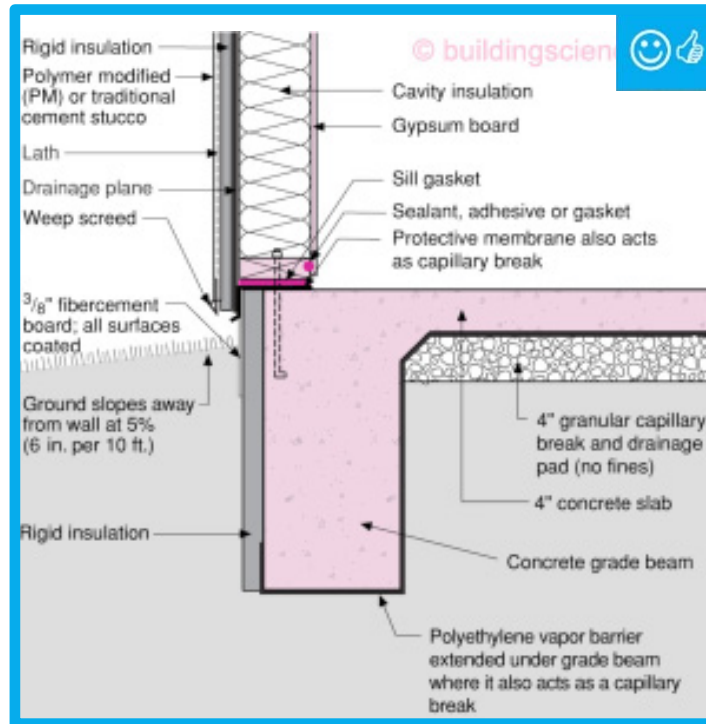
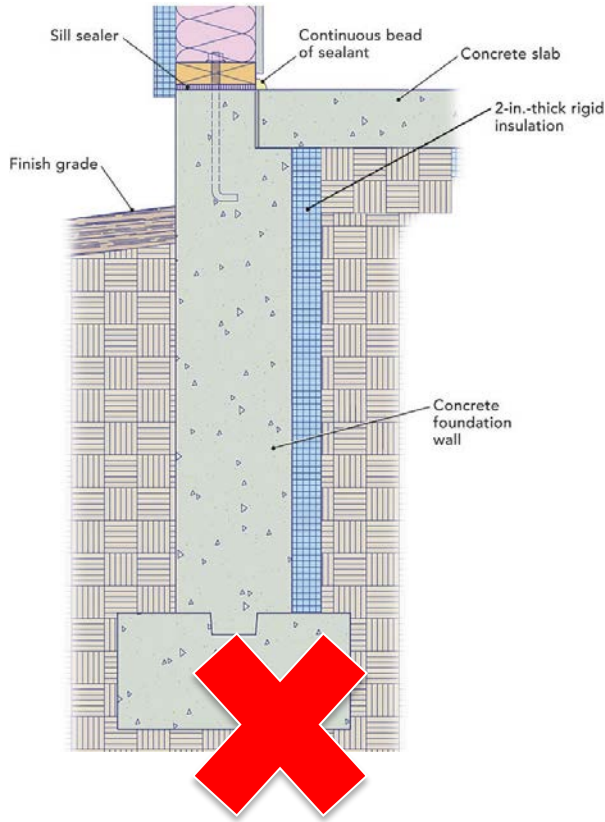


1. NO COMPRESSION AND MISALIGNMENTS—Insulation is installed without misalignments/compression. Insulation material is in full contact with all sides of the cavity. Insulation is cut/split around plumbing, HVAC and electrical components (TERC 2, 3, 4.3)

~ Minimum Specific Requirements ~

Code Language: The perimeter insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. *The perimeter insulation shall extend downward from the top of the slab* for the minimum distance shown in the table or to the top of the footing, whichever is less, or downward to not less than the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table.

Examples



Impact of lack of slab insulation in 'Infrared' paired images

