**Comment/Explanation\*:***Include your justification for your proposed change to the draft standard below.*  
Section 4.2.2.3.2.2 includes language that would force a Rater to model an entire swath of wall as being “Not Properly Installed” due to a single cavity being “Not Properly Installed”.

By not allowing a Rater to separate an assembly in the model due to any *single* affecting features (insulation type, orientation, floor level, material type, grade), it restricts a Rater from limiting the impact of as little as a *single* bad cavity install.

I have no idea why this standard update was included. It doesn’t matter for an energy rating in the sense there are no programmatic requirements to achieve a properly installed cavity - it’s just an assessment. And if a dwelling unit is participating in an above-code program such as ENERGY STAR® they’re required to have **all** Grade 1 / Properly Installed insulation anyways. So why even dictate to Raters they can’t separate an assembly out based upon the grading? We can (and this update includes language) break an assembly out based on orientation, insulation type, etc.

If a Rater *wants* to take the penalty for an entire wall assembly, fine! If they want to granularly model a dwelling unit down to a single cavity, let them! As long as they have photo documentation and don’t try to pass it off as something it’s not, why?

An example - many single family dwelling units have a long uninterrupted wall. These usually have the same orientation, construction type, and insulation type. They are typically 40’ to 50’ in length, though I’ve personally seen 60’ long uninterrupted side walls. If a Rater performs the inspections appropriately (per this update: “Visually confirm all areas of framed wall insulation…”) they could encounter at least *one* cavity in that entire wall with “not properly installed” insulation.

Maybe the batt wasn’t correctly cut and the installers shoved wires behind it, instead of cutting around them. Perhaps the SPF installers didn’t have a good mix on the first cavity and there were visible cracks greater than 1/16”.

By not giving the Rater the discretion to separate out to a granular level at least a *single* cavity, you could be damning an entire wall of hundreds of square feet (ex. 40’ x 8’ = 320 sq. ft.) to a “Not Properly Installed” designation because there are no other defining features to separate the cavity out.

This language further restricts Raters by requiring (unclearly, I might add) a *combination* of factors to determine how they model a dwelling unit’s assemblies. While I agree there should be clear guidelines on what should determine separating assemblies in an energy model, this language does NOT perform that task.

Proposed Change to the Draft Standard\*  
Use “strikethrough” and “underline” formatting to indicate all proposed changes. Changes must be shown with “hard-formatting” strikethrough and underline, not “track changes”.

Current Language:

**4.2.2.3.2.2** ~~Insulated surfaces categorized as “Grade II” shall be modeled such that there is no insulation R-Value for 2 percent of the insulated surface area and its measured or labeled value, including other adjustments,~~~~[[1]](#footnote-1)~~ ~~for the remainder of the insulated surface area (not including framing or other structural materials).~~ Insulated surfaces categorized as ~~“Grade III”~~ Not Properly Installed shall be modeled with the Assessed R-value that is determined in accordance with Appendix A for 90% of the insulated surface area and ~~such that there is~~ no insulation R-Value for ~~5~~ 10 percent of the insulated surface area~~.~~,3 ~~and its measured or labeled value, including other adjustments,~~~~[[2]](#footnote-2)~~ ~~for the remainder of the insulated surface~~ area (not including framing or other structural materials).

Areas of an assembly shall not be modeled separately solely based upon insulation grading. Where an insulated surface is categorized as Not Properly Installed, all insulated surface area with the same Assessed R-value, orientation, floor level, and insulation material shall be categorized as Not Properly Installed.

Proposed Language:

**4.2.2.3.2.2** ~~Insulated surfaces categorized as “Grade II” shall be modeled such that there is no insulation R-Value for 2 percent of the insulated surface area and its measured or labeled value, including other adjustments,~~~~[[3]](#footnote-3)~~ ~~for the remainder of the insulated surface area (not including framing or other structural materials).~~ Insulated surfaces categorized as ~~“Grade III”~~ Not Properly Installed shall be modeled with the Assessed R-value that is determined in accordance with Appendix A for 90% of the insulated surface area and ~~such that there is~~ no insulation R-Value for ~~5~~ 10 percent of the insulated surface area~~.~~,3 ~~and its measured or labeled value, including other adjustments,~~~~[[4]](#footnote-4)~~ ~~for the remainder of the insulated surface~~ area (not including framing or other structural materials).

Areas of an assembly shall ~~not~~ be modeled separately ~~solely~~ based upon assembly characteristics, such as insulation grading~~. Where an insulated surface is categorized as Not Properly Installed, all insulated surface area with~~ , the same Assessed R-value, orientation, floor level, and insulation material ~~shall be categorized as Not Properly Installed~~.

|  |  |  |
| --- | --- | --- |
| Foundation  insulation | Determine and record type,  ~~grade~~PI/NPI, location, and thickness of foundation insulation and resultant R-Value. | Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. ~~, and grade~~ The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI).  Visually confirm insulation location as interior, exterior or both108 sides of the foundation wall, record Assessed R-Value and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record R-Value. ~~If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the R-Value based on installed thickness.~~ For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturer’s data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the Assessed R-Value or emittance of the installed material.  A diagram of a house  Description automatically generated  Where the foundation wall has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. ~~Areas of the foundation wall shall not be modeled separately solely based upon insulation grading.~~  If 100% of the area/perimeter of ~~the~~ exterior continuous foundation insulation cannot be visually confirmed, inspection shall be allowed according to the below:  Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the foundation insulation specified for insulation, and visually confirm and record R-Value. Where the Assessed R-Value cannot be determined during site observation, the manufacturer’s data sheet shall be used. Use the inspection procedures in Normative Appendix A to determine if insulation is PI or NPI. ~~determine and record the grade of insulation.~~ The insulation assessment ~~grade~~ of the visually confirmed area shall be applied to the rest of the area unless photos show ~~any~~ additional deficiencies, in which case the insulation assessment ~~grade~~ recorded shall be the worst case documented.  Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. If foundation insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above. |
| Slab-on-grade insulation | Determine and record type, ~~grade~~PI/NPI, location, and thickness of slab-on-grade insulation and resultant R-Value. | Slab perimeter insulation is installed vertically, ~~either~~ on the outside of the slab extending above and/or below grade ~~or~~ between the foundation wall and the slab itself or separating a slab in conditioned space from a slab in unconditioned space (i.e., garage or entry porch slab). Under slab insulation is installed horizontally, either along the slab perimeter or underneath the entire slab.  Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. ~~, and grade~~  The Assessed R-Value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.  Visually confirm location as horizontal or vertical, record the Assessed R-Value and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record Assessed R-Value. ~~If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine the R-Value based on installed thickness.~~ For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturer’s data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the Assessed R-Value or emittance of the installed material.  Where the slab-on-grade has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. ~~Areas of the slab-on-grade shall not be modeled separately solely based upon insulation grading.~~  If 100% of the area/perimeter of the slab insulation cannot be visually confirmed, inspection shall be allowed according to the protocol below:  Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the slab specified for insulation and visually confirm and record R-Value. If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the Assessed R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine if insulation is PI or NPI. ~~determine and record the grade of insulation.~~ The insulation assessment ~~grade~~ of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the insulation assessment ~~grade~~ recorded shall be the worst case documented.  Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type and grade of the insulation installation. |
| Wall Insulation Installation | Determine and record type, ~~grade~~PI/NPI, and thickness of framed wall insulation and resultant R-Value. | Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. ~~, and grade~~ The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1. or based on measured thickness and manufacturer listed R-Value per unit thickness.  Visually confirm all areas of framed wall insulation and record the Assessed R-Value and measure thickness. ~~If insulation is observed, but the R-Value cannot be determined during site observation, the manufacturer’s data sheet shall be used.~~  For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturer’s data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.  Where the wall has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. ~~Areas of the wall shall not be modeled separately solely based upon insulation grading.~~ |
|  |  | If 100% of the area of ~~the~~ continuous exterior insulation cannot be visually confirmed, inspection shall be allowed according to the protocol below:  Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record the Assessed R-Value and measure thickness. If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the Assessed R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine if the insulation is PI or NPI. ~~determine and record the grade of insulation.~~ The insulation assessment ~~grade~~ of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the insulation assessment ~~grade~~ recorded shall be the worst case documented.  Photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation.  If exterior insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above. |
| Below ~~R~~roof deck insulation | Determine and record type, ~~grade~~ PI/NPI, and thickness of below roof deck insulation and resultant R-Value. | Identify the location of the roof deck insulation. The insulation can be either above or below the roof deck.  Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. ~~, and grade~~  The Assessed R-Value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.  Visually confirm whether the insulation product is installed for 100% of required area and visually confirm and record the Assessed R-Value and measure thickness. ~~If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine the R-Value based on installed thickness.~~  For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturer’s data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.  Where the roof deck has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. ~~Areas of the roof deck shall not be modeled separately solely based upon insulation grading.~~  If 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:   * Visually confirm insulation product is installed for a minimum of 20% of the area specified for insulation and visually confirm and record the Assessed R-Value and measure thickness. * If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine the grade of insulation. * The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented. * Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. * If roof deck insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above. |
| Above roof deck insulation | Determine and record type PI/NPI, and thickness of above roof deck insulation and resultant R-Value. | Identify the location of the roof deck insulation. The insulation can be either above or below the roof deck.  Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-Value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.  Visually confirm whether the insulation product is installed for 100% of required area and visually confirm and record the Assessed R-Value and measure thickness.  For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturers data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.  Where the roof deck has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. ~~Areas of the roof deck shall not be modeled separately solely based upon insulation grading.~~  If 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:   * Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record the Assessed R-Value and measure thickness. * If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine and record the grade of insulation. * The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented. * Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. * If roof deck insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above. |

1. (Informative Note) Such as compression and cavity fill versus continuous.

   3 (Normative Note) The Assessed R-value shall include the installed insulation only and shall not include framing or other structural materials. [↑](#footnote-ref-1)
2. ~~(Informative Note) Such as compression and cavity fill versus continuous.~~ [↑](#footnote-ref-2)
3. (Informative Note) Such as compression and cavity fill versus continuous.

   3 (Normative Note) The Assessed R-value shall include the installed insulation only and shall not include framing or other structural materials. [↑](#footnote-ref-3)
4. ~~(Informative Note) Such as compression and cavity fill versus continuous.~~ [↑](#footnote-ref-4)