Guide to Grading Installations of Home Insulation

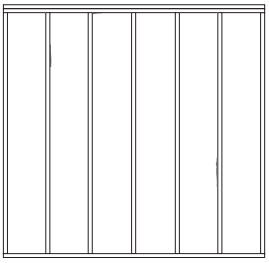
At Ameren Missouri, we're proud to help today's home builders, contractors and code officials stay up-to-date on current building codes and energy efficiency best practices. While this insulation guide doesn't include every requirement, it provides an easy-to-understand overview of how to recognize the differences between Grades I, II and III – and how to achieve Grade I in order to reach compliance.

Why is having properly installed insulation important?
Gaps, voids and compressions in insulation allow hot or cold air into the wall cavities, ceilings and floors. These drafts result in decreased insulating value, increased heating and cooling expenses, and encourage the formation of condensation, which leads to mold growth over time.

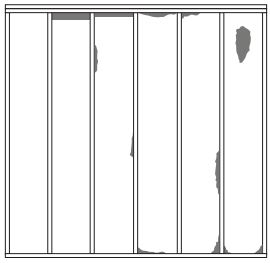
How can you tell if the insulation is up to code?
When insulation installation is assessed, assemblies are often classified as Grade I, Grade II, or Grade III. These grades are determined by evaluating two criteria: **missing insulation** and **compression**. **Grade I is the only grade considered to be code compliant for the prescriptive path**, as it is generally installed according to manufacturers' instructions (Section 303.2 2009 IECC).

First Criteria: Missing Insulation

The first criteria when determining an insulation installation's grade is measuring any missing insulation.
(Diagrams based on Home Energy Rating System Standards)



Grade I*
0% to 0.5% of the area
(or up to 7 sq. in. per stud bay)
of missing insulation is observed.



Grade II*
0.5% to 2% of the area
(or 7 sq. in. to 27 sq. in. per stud bay)
of missing insulation is observed.

Grade III*
More than 2% of the area
(or more than 27 sq. in. per stud bay)
of missing insulation is observed.

Second Criteria: Compression

The second criteria when determining insulation grade is measuring the level of compression.**

Grade I*: Up to 2% compressed area (27 sq. in. per stud bay) must be >70% of the intended depth.

Grade II*: Up to 10% compressed area (133 sq. in. per stud bay) must be >70% of the intended depth.

Grade III*: A total compression area of more than 10% (or more than 133 sq. in. per stud bay).

Insulation Code Compliance Challenges

It's often immediately clear whether insulation installation is Grade I or Grade III. However, distinguishing between Grades I and II can be far more difficult. Since Grade II is not code compliant, a close evaluation is extremely important. Taking a closer look and asking, "Is the batt split around wiring or piping?", "Is it cut tightly around switches and receptacles?", "Do the compressed areas reduce thickness to under 70% of the intended depth?", "Is the total area of missing insulation less than 0.5%?" will help you reach a final determination. In short, carefully assessing the total sum of imperfections you find will more clearly lead to a Grade I or Grade II classification.

Photographic Examples

For reference, please review these examples of actual Grade I, II and III insulation assemblies.

Grade I: Compliant

No noticeable gaps or compression

Insulation is cut and split around electrical wiring

Insulation in full contact with conditioned space

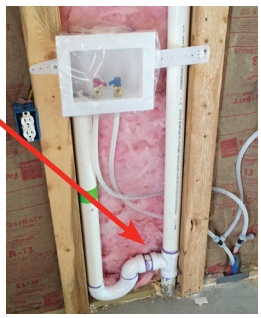
Grade II: NOT Compliant

Excessive compression

Insulation is not cut around electrical box

Grade III: NOT Compliant

Significant gaps and insulation does not fill entire cavity



Insulation is not cut and split around plumbing

Other Helpful Resources

In addition to this guide, you can refer to these helpful online resources.

U.S. Department of Energy Insulation Guide
www.energy.gov/energysaver/weatherize/insulation

Tech Tips from the North American Insulation Manufacturers Association (NAIMA)
https://insulationinstitute.org/wp-content/uploads/2016/01/Insulation-Institute-Tech-Tips.pdf

* Suggested ranges based on RESNET guidelines. Area calculations are based on an 8 ft. ceiling with 16 in. stud bays.
** The Insulation Institute allows inset stapling but it is not recommended here since it reduces the R-value of the wall.