

Fiberglass Batts- Labeled vs. Installed Performance

Consumer Update: Insulation Effectiveness Bulletin

Summary: Oak Ridge National Laboratory research shows that “perfectly installed” batts lose 11% of their labeled R-Value, and that “commonly installed” fiberglass batts lose 28% of their labeled R-value.¹

This study confirms tests conducted 20 years ago by fiberglass manufacturers, and reveals the surprisingly large disparity between the labeled R-value and the installed R-value of fiberglass batts.²

Who: Oak Ridge National Laboratory³

What Was Measured:

The R-value results presented here are the *clear wall R-values*, which Andre Desjarlais of Oak Ridge explains, “includes the studs, top and bottom plates, sheathings and exterior façade... It does not include additional structural components around details such as corners, windows, etc.”⁴

“The *clear wall R-value*... represents the area of the wall containing insulation and only the necessary structural member away from all interface details.”⁵

Why:

“To address the number one wall research need...whole wall performance was ranked by 270 private building industry contributors as the most important public sector R&D need to accelerate the development and application of energy-efficient building walls.”⁶

How:

Full-size walls were constructed and tested to determine their thermal conductivity.⁷

What Did They Find:

The highest tested R-value for “R-19” labeled batts before they were installed. From there, the test results dropped to R-17 and then R-13.7⁸

“R-19” batts have an R-value of 13.7 when installed as commonly found in actual walls.⁹

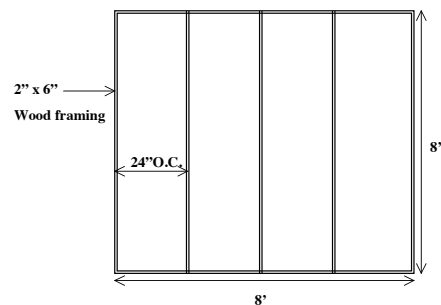


Figure 1 – Full size 8’ x 8’ wall sections were built using 2 x 6 wood framing 24” o.c. (Note that 89% of the surface area of the wall is insulated with “R-19” labeled batts and just 11% is wood framing.)

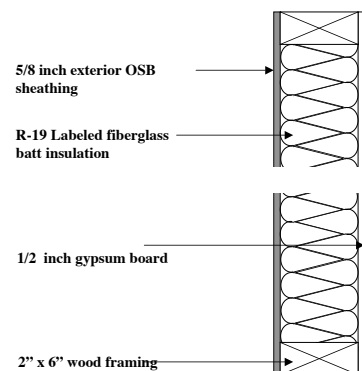


Figure 2 – The 2” x 6” wood framed wall was insulated with “R-19” labeled fiberglass batts and enclosed with 5/8 inch exterior OSB sheathing and 1/2 inch gypsum board.

Labeled vs. Installed Performance - *Explained*

Q: Did an independent laboratory conduct the tests? Who funded the tests?

A: Oak Ridge National Laboratory conducted the research. Oak Ridge is completely independent and funded by the US Department of Energy.¹⁰

Q: Why were the tests conducted?

A: According to Oak Ridge, builders, architects, designers, and homeowners want energy-efficient walls. The best way to determine how insulation systems perform is to build and test full-size walls.¹¹

Q: Can't R-values be used to compare insulation systems?

A: R-values are a good starting point – but they are the results of small, meticulously prepared laboratory samples and do not necessarily reveal how an insulation system performs once installed in actual buildings. Different insulation systems with the same laboratory “R-value” can deliver much different levels of comfort and energy efficiency.¹²

Q: What did the researchers find?

A: The researchers found that fiberglass batts deliver far less than their labeled R-value in real walls, as shown in Figures 3 and 4.¹³

Q: Where does the R-value go?

A: Technically, the “R-value” doesn't change because it is based on specific laboratory test claims by the fiberglass manufacturers. However, the Oak Ridge research reveals the following:

- “R-19” labeled fiberglass batts have an R-value of 17.4 *before they are installed*.¹⁴
- “R-19” fiberglass batts have an R-value of 17.0 when installed *perfectly* (the scientists installed the batts before installing the exterior sheathing to precisely fit the batts in place from both sides).¹⁵
- “R-19” fiberglass batts have an R-value of 13.7 when installed as commonly found in actual walls.¹⁶

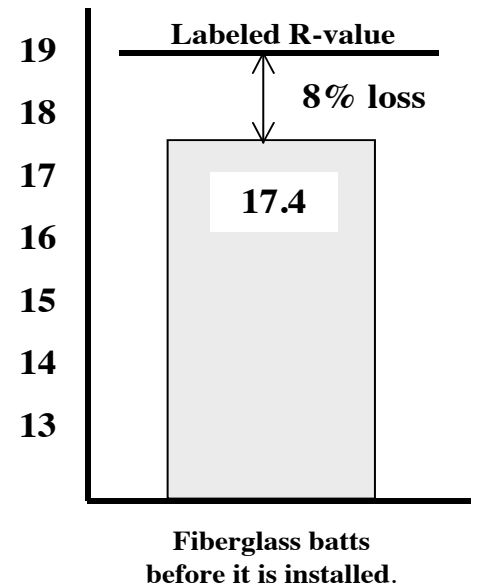


Figure 3 – Before any of the installation tests were begun, the fiberglass batts were tested and found to provide R-17.4

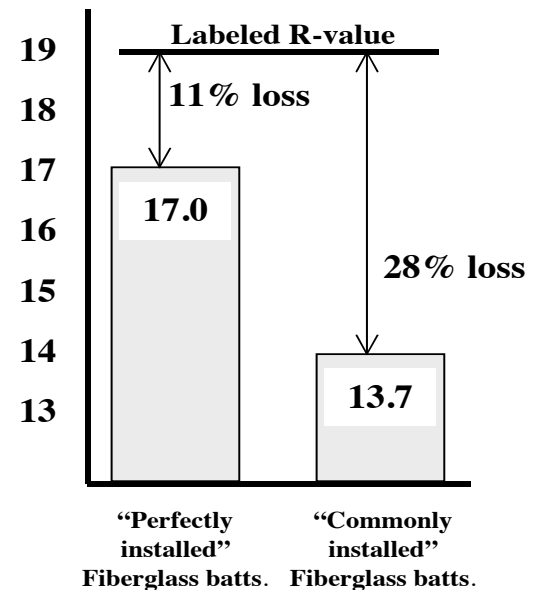


Figure 4 – Taking the framing, OSB, and gypsum board into account, the R-19 fiberglass batt insulation provided much less than its labeled R-value

Sources:
¹⁰ J.E. Christian, J. Kosny, Andre Desjarlasi, and P.W. Childs, “The Whole Wall Thermal Performance Calculator –On the Net”, Thermal Performance of the Exterior Envelopes of Buildings VII, 1998.
¹¹ R.M. Neisel, “A Study of the Effects of Insulation Gaps on Building Heat Losses, Final Report,” Johns-Manville Sales Corp, 1979
¹² Christian, et al.
¹³ “Wall R-Values”, Personal Correspondence, 2000
¹⁴ Christian, et al.
¹⁵ D.W. Yarbrough, Telephone Conversation, 2000.
¹⁶ Christian, et al.
¹⁷ Yarbrough
¹⁸⁻¹⁹ Christian, et al.
 Source for Figures 1-4: Christian, et al.