



InSoFast® Outperforms R-13 Fiberglass

As you will see in the charts below, InSoFast panels with a total wall assembly R-Value of 11.08 will outperform the traditional 2x4 framed wall using R-13 fiberglass insulation.

Oak Ridge National Laboratories, an independent testing facility, did a study on the actual performance of “Perfectly Installed” and real world “Typically Installed” fiberglass insulation. Their findings show that fiberglass insulated walls can fall short of their stated R-13 value by 11% to 28%.

Using the “Typically Installed” performance of fiberglass, InSoFast performs 8.4% better than the R-10.22 of the traditional wall assembly.

Component	R-Value of “Typically Installed” R-13 Fiberglass Framed Wall		InSoFast Wall Assembly
	Studs	Cavity Only	
Exterior Air Film	0.17	0.17	0.17
Concrete Foundation	1.28	1.28	1.28
3-1/2” Fiberglass Batt R-13	---	9.36*	---
3-1/2” Stud	4.38	---	---
InSoFast Stud	---	---	8.50
1/2” Drywall	0.45	0.45	0.45
Interior Air Film	0.68	0.68	0.68
Percent for 16” O.C. plus Studs	15%	85%	---
Total Wall Component R- Value	6.96	11.94	11.08
Wall Component U-Value	0.176	0.084	0.09
Total Wall Assembly R-Value	---	10.22	11.08

* Fiberglass Batts-Labeled vs. Installed Performance—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. [See documentation.](#)

$$R\text{-Value Calculation: Assembly R-Value} = 1 / (\text{Assembly U-Value}) = 1 / (u\text{-Studs} \times \% + U\text{-Cavity} \times \%)$$

[R-Value List for Building Materials](#)

InSoFast, LLC
Fridley, MN 55432

888-501-7899

www.InSoFast.com

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 was R-17.4 for 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

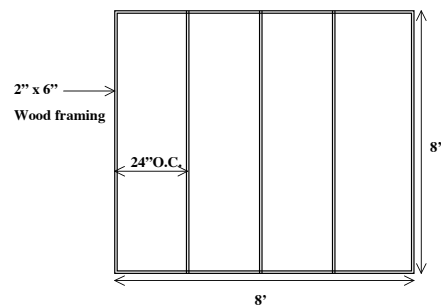


Figure 1 – Full size 8’ x 8’ wall sections were built using 2 x 6 wood framing 24” o.c. (Note that 89% of the surface area of the wall is insulated with “R-19” labeled batts and just 11% is wood framing.)

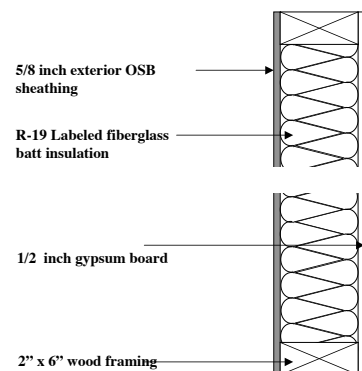


Figure 2 – The 2” x 6” wood framed wall was insulated with “R-19” labeled fiberglass batts and enclosed with 5/8 inch exterior OSB sheathing and 1/2 inch gypsum board.

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

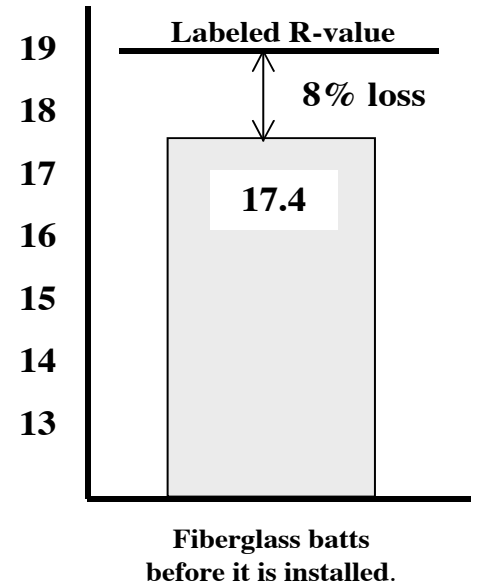


Figure 3 – Before any of the installation tests were begun, the fiberglass batts were tested and found to provide R-17.4

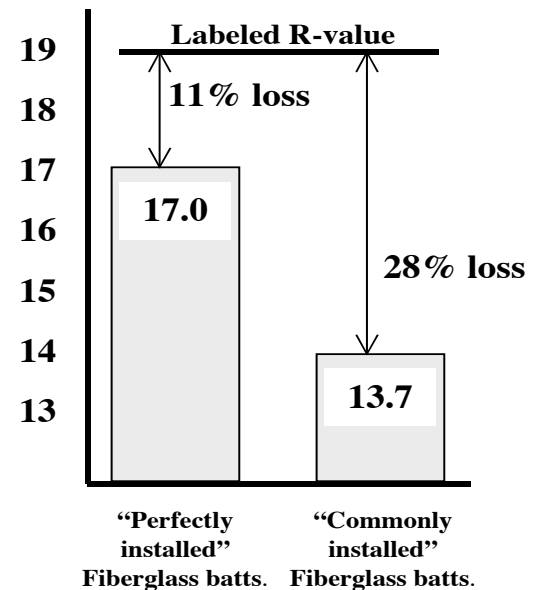


Figure 4 – Taking the framing, OSB, and gypsum board into account, the R-19 fiberglass batt insulation provided much less than its labeled R-value

Sources:

¹ J.E. Christian, J. Kosny, A.O. Desjarlasi, and P.w. Childs, “The Whole Wall Thermal Performance Calculator –On the Net”, Thermal Performance of the Exterior Envelopes of Buildings VII, 1998.

² R.M. Neisel, “A Study of the Effects of Insulation Gaps on Building Heat Losses, Final Report,” Johns-Manville Sales Corp, 1979

³ Christian, et al.

⁴ “Wall R-Values”, Personal Correspondence, 2000

⁵⁻⁹ Christian, et al.

¹⁰ D.W. Yarbrough, Telephone Conversation, 2000.

¹¹ Christian, et al.

¹² Yarbrough

¹³⁻¹⁶ Christian, et al.

Source for Figures 1-4: Christian, et al.



InSoFast® Comparison to R-13 Fiberglass

How Does InSoFast Compare to a Framed Wall with Fiberglass Insulation?

The Department of Energy is clear in its opinion that framed walls with any type of batt insulation is ineffective as a thermal barrier. InSoFast panels provides significant advantages in every important category. A wall system utilizing the InSoFast panels will outperform the framed wall with fiberglass insulation and provide a comfortable and safe living environment. InSoFast looks forward to elevating building codes beyond today's wood frame standard to a higher performance level.

A Wall System Built with InSoFast Panels outperform the Frame Wall with R-13 Insulation in 17 categories!

	Framed Walls	InSoFast Wall System
Wall System Description	A concrete wall along with a 2x4 wall framed at 16" o.c. installed with R-13 fiberglass insulation as well as a vapor barrier that is often used to keep moisture from reaching the drywall.	InSoFast panels installed against a concrete wall with a drywall finish.
Actual Thermal Performance of Wall System	R-Value of 10.22	R-Value of 11.08
Thermal Breaks	Each stud location represents a thermal short circuit in the insulating barrier, allowing moisture-filled air to pass. When wood 2x4 framing is used, 15 - 25% of the wall surface is comprised of 2x4 framing that is R-4.	InSoFast Panels are manufactured with fully insulated studs which eliminate thermal breaks. Interlocking flanges create a tight seal at each panel connection.
Moisture Effect on R-Value	Fiberglass can lose as much as 80% of its R-value when exposed to even low moisture levels, which are common below grade. Moisture leads to wood decay.	When exposed to moisture, the R-value of InSoFast Panels remains constant and will shed liquid water.
Permeability	Frame walls built with vapor barriers are impermeable, trapping moisture inside the wall cavity where moisture can lead to mold and decay.	InSoFast Panels are vapor semi-permeable and do not inhibit the walls ability to dry.

InSoFast, LLC

888-501-7899

www.InSoFast.com

	Framed Walls	InSoFast Wall System
Temperature Effect	Fiberglass insulation loses as much as 40% of its insulating capacity when temperatures fall below 20°F and over half its R-value below 0°F.	The thermal performance of InSoFast Panels is not degraded by changes in temperature. In fact, studies have shown R-values to improve as temperatures decrease.
Compression Effect	Fiberglass must be fully expanded to work properly. If it is stuffed into openings or compressed by plumbing or electrical wires, it loses most of its R-value.	Wires are easily installed into pre-formed channels in the InSoFast panel.
Mold and Mildew	Organic wood studs absorb moisture and support mold growth. Fiberglass insulation also absorbs moisture and promotes mold growth.	InSoFast panels do not promote mold growth. Semi-permeable panels allow moisture to dry inward as recommended by the Building Science Consortium.
Off-gassing Indoor Air Quality	Wood building materials and fiberglass insulation are often treated with preservatives and formaldehyde. Mold and airborne toxins contaminate the indoor air quality.	InSoFast panels manufactured with no ozone depleting CFCs or HCFCs. No toxins or formaldehyde is produced. The InSoFast panels are inert and experience no physical or chemical breakdown over time.
Strength & Stability	Wood frame construction exceeds strength requirements but degrades over time. Wood framing members warp and twist as moisture levels vary. Nail “pops” are common.	InSoFast panels are stable and unaffected by moisture variances. Panels exceed a 2,000# pull test. Polypropylene studs provide a stable surface with superior holding power and eliminate nail pops.
Water Absorption of Insulation	Fiberglass insulation can hold many times its weight in water. Water damaged fiberglass insulation must be removed and replaced.	The maximum adsorption by total immersion is less than 3% moisture content for the InSoFast panel. ASTM:D6817
Water Absorption of Framing Members	The standard moisture content for above grade wood framed wall is 10 - 15%. By adding just 5% more moisture, such as in a basement installation, mold will grow.	The InSoFast stud is a plastic product and will not absorb water or rot away.

	Framed Walls	InSoFast Wall System
Vapor Control	Basement walls must be able to dry. For walls built below grade, drying typically means towards the interior. Adding vapor barriers to control the moisture actually keeps the moisture from being able to dry properly. If placed directly against the masonry wall, an impermeable barrier keeps moisture from being able to dry towards the interior. If installed over the wood frame moisture is trapped inside the wall cavity causing wood to rot and mold to grow.	InSoFast Panels are a Type III Vapor Retarder and are inherently mold resistant. This type of semi-permeable foam is the perfect insulating material for basements. Moisture is able to dry inward as recommended by the Building Science Consortium.
Installing Insulation	The performance of the thermal barrier is dependent in part upon the quality of workmanship. For fiberglass insulation to work effectively, it must be in continuous contact with its surrounding surfaces on all six sides. It is virtually impossible for installers to achieve this on a job site. Even the smallest gap allows air circulation which kills the insulation value.	InSoFast Panels are installed in a consistent manner with no gaps. Tongue & groove connections and alignment notches make installations foolproof. Thermal performance is consistent.
Space Savings	The current standard of frame construction with ½” drywall and a 1” air gap requires 5”. The air gap is an attempt to keep the fiberglass from coming in direct contact with the concrete surface.	With InSoFast, every room will be larger. The panel is 2” thick including the built-in drainage channels.
Environmental Impact	Wood framing members are produced from trees and treated with preservatives. Fiberglass insulation is often produced with formaldehyde.	No trees are harvested leaving them to absorb CO2. InSoFast panels require 25% less energy to produce than fiberglass insulation. The InSoFast studs are made from 100% recycled material.
Durability - Service Life	Wood frame walls attract moisture, mold, and insects which eventually leads to wood rot and deterioration.	InSoFast Panels are not susceptible to moisture, insects, or mold and provide an unlimited service life.



InSoFast® Cost Savings -- Basements

How much will Insulating the Basement save?

According to the Department of Energy's Building America Report, an un-insulated basement can account for up to one third of the heat loss of a residential structure.

The DOE report states that by installing R-5 insulation with a total assembly R-Value 7.13 on the interior of a basement wall, the heat loss will be cut by 70%. Based on this report, installing InSoFast panels with an R-Value of 8.5 and a total assembly R-Value 11.08 will reduce the heat loss by 81%.

Example: Annual Heating Bill of \$1,000

An Un-insulated Basement accounts for up to 1/3 of Heat Cost = \$333

Insulation Type	Savings %	Heat Dollars Saved
Un-insulated Basement Heat Loss of 70%	0	\$0.00
R-5 Wall System	70%	\$231.10
2x4 with R-13 Fiberglass	79%	\$263.07
InSoFast Wall System	81%	\$269.73

InSoFast can lower your whole house heating bill and your carbon footprint by as much as 26%.

How long is the Payback for InSoFast?

InSoFast panels have a payback that starts immediately and returns the full investment in a little as six to seven years for the average basement.

InSoFast, LLC

888-501-7899

www.InSoFast.com