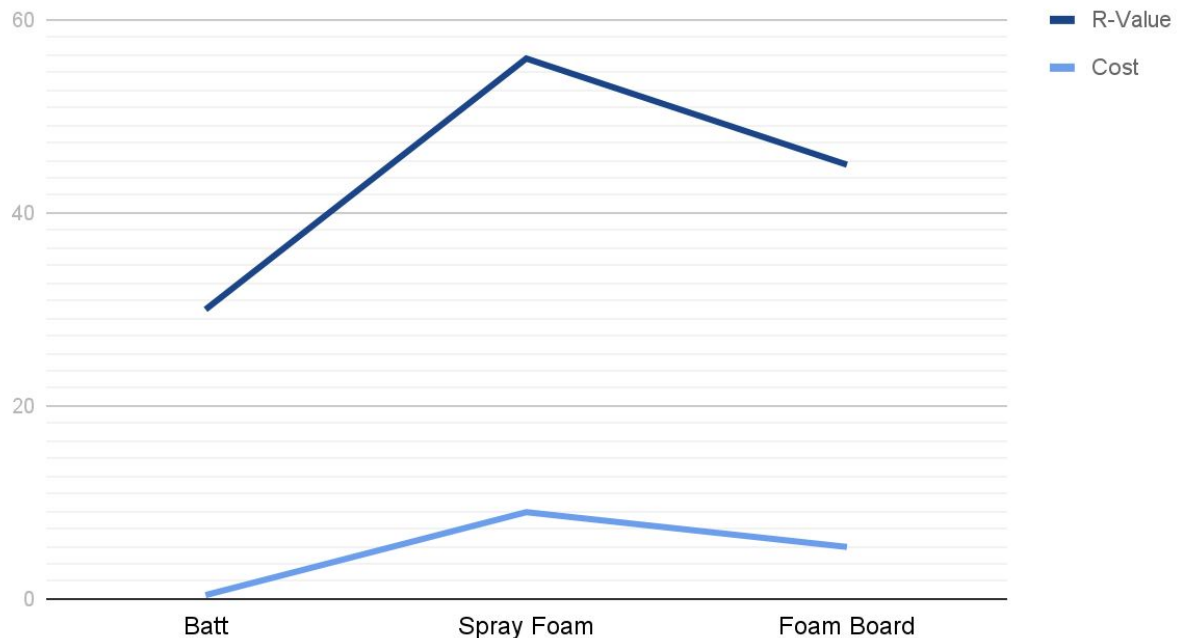


Typical insulation materials

Product	R-Value	Cost (per sq. ft.)	Descriptions
Fiberglass Batt 9 ½ (Standard)	30	\$0.39 to \$0.43 (avg. \$0.41)	<ul style="list-style-type: none"> • Application: Unfinished walls, including foundation walls; floors and ceilings • Installation: Fitted between studs, joist, and beams • Advantages: DIY; Suited for standard stud and joist spacing; Relatively inexpensive
Closed-cell foam Foamed-In-Place	R-6.2 per inch (9 inch = 56)	\$1 to \$1.50 per board ft. (\$9)	<ul style="list-style-type: none"> • Application: Enclosed existing wall; Open new wall cavities; Unfinished attic floors • Installation: Applied using small spray containers or in larger quantities as a pressure sprayed (foamed-in-place) product. • Advantages: Good for adding insulation to existing finished areas, irregularly shaped areas, and around obstructions.
Foam board / Rigid foam	from R-4 to R-6.5 per inch of thickness (R-5 x 9" = 45)	\$5.40	<ul style="list-style-type: none"> • Application: Unfinished walls, including foundation walls; floors and ceilings; Unvented low-slope roofs • Installation: Interior applications must be covered with 1/2-inch gypsum board or other building-code approved material for fire safety; Exterior applications must be covered with weatherproof facing. • Advantages: High insulating value for relatively little thickness; Can block thermal short circuits when installed continuously over frames or joists.

Insulation Materials



Fiberglass Batt Insulation

Thickness (Inches)	R-Value	Cost (cents/sq.ft.)
3 1/2	11	12-16
3 5/8	13	15-20
6 to 6 1/4	19	27-34
5 1/4 (High Density)	21	33-39
8 to 8 1/2	25	37-45
8 (High Density)	30	45-49
9 1/2 (Standard)	30	39-43
12	38	55-60

Typical window assemblies

Product	Center-of-glass	Assembly (Metal Frame)	Descriptions
Single-Glazed, Clear Glass	1.04	≥ 1.00	Relative to all other glazing options, single-glazed with clear glass allows the highest transfer of energy while permitting the highest daylight transmission.
Double-Glazed, Clear Glass	0.48	0.71-0.99	A typical clear, double-glazed unit has two lites of glass with the inner and outer layers of glass both being clear and separated by an air gap.
Double-Glazed, High-solar-gain Low-E Glass	0.26	0.56-0.70	a typical double-glazed window with a high-solar gain low-E glass with argon gas fill. These windows are designed to reduce heat loss but admit solar gain.

Center-of-glass u-value seems to have a lower value (more effective) than the assembly u-value. "[Center of glass values] should only be used to compare the effect of different glazing types, not to compare total window products. Frame choice can drastically affect performance".

References:

1. "Types of Insulation." Department of Energy. Accessed November 02, 2017. <https://energy.gov/energysaver/types-insulation>.
2. "Learn how much it costs to Install Spray Foam Insulation." 2017 Spray Foam Insulation Cost Calculator | Average Spray Foam Prices. Accessed November 02, 2017. <https://www.homeadvisor.com/cost/insulation/install-spray-foam-insulation/>.
3. "Home." Types & Installation Prices. Accessed November 02, 2017. <https://www.remodelingexpense.com/costs/cost-of-foam-board-insulation/>.
4. Window Glazing Types | Efficient Windows Collaborative. Accessed November 04, 2017. <http://www.efficientwindows.org/gtypes.php>.