

KNOW YOUR THERMAL INSULATION

01 WHAT IS THERMAL INSULATION?

Thermal insulation acts as a barrier that **slows down the transfer of heat** between the inside and outside of a building via **convection, conduction, and radiation**.

Heat flows from **warmer to cooler areas**. In hot weather, insulation and **air sealing** prevent excessive heat gain by slowing down the amount of warm air that enters through walls, ceilings, and floors. In cold weather, insulation and air sealing work in reverse, preventing excessive heat loss by slowing down the amount of warm air that escapes outdoors.

An insulating material's resistance to heat flow is measured by its **R-value** (R stands for Resistance). A higher R-value indicates greater insulating effectiveness. Insulation R-values depend on **material type, thickness, and density** as well as **temperature, aging, and moisture accumulation**.

Roof and attic ventilation may be provided by a ridge vent or gable vents.

Air space

Unconditioned space

Conditioned space

A soffit vent allows outdoor air to enter a home and remove moisture from the attic.

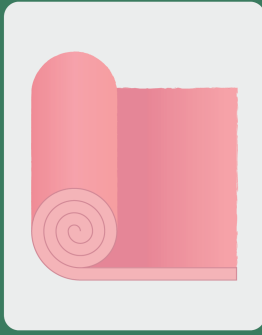
Depending on the local climate, a vapor barrier may be placed on the warm side of insulation to prevent condensation.

In order to remove moisture, odors, and pollutants, one can (1) vent the crawl space or (2) install a vapor barrier, seal the vents, insulate the foundation, and add mechanical ventilation.

By limiting ground moisture penetration, a crawl space vapor barrier minimizes thermal loss, reduces energy usage, and improves indoor comfort and air quality.



02 TYPES OF INSULATION



Blanket: batts or rolls

R-value: 2.9–3.8*

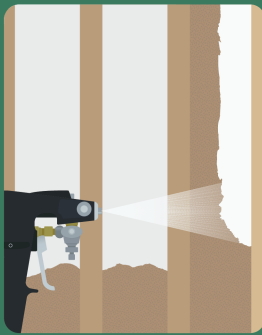
Blanket insulation is made of fiberglass, mineral wool, plastic fibers, or natural fibers and can be installed in unfinished walls, floors, and ceilings.



Rigid foam

R-value: 3.6–6.8*

Offering nearly double the R-value for the same material thickness, rigid foam insulation is costly but can be applied in almost any part of your home.



Spray foam

R-value: 4.0–6.5*

Composed of a chemical foam that expands and hardens to fill tight gaps, spray foam insulation is an effective air sealing and waterproofing agent.



Loose-fill or blown-in

R-value: 2.2–3.8*

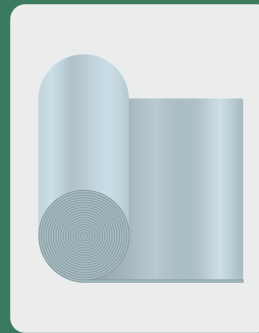
Typically blown into place with a special machine, this insulation is best used in attics, hard-to-reach or irregularly shaped spaces, and already insulated areas.



Structural insulated panels (SIPs)

R-value: 4.0–7*

Durable and cost-effective, SIPs consist of insulating foam core sandwiched between two sheets of structural material and are used for new construction.



Radiant barrier

R-value: N/A

Radiant barriers reflect heat instead of absorbing it. Depending on the local climate, they may be installed in attics along with proper air sealing and insulation.

*Per inch of thickness

03 OTHER CONSIDERATIONS



Climate zone



Cost



Leaks & ventilation



Available space

04 WHY THERMAL INSULATION?

Pros

- + Notable **return on investment (ROI)** through **energy savings**
- + Improved **indoor comfort**
- + Reduced **moisture condensation, corrosion & pollutant emissions**
- + Eligible for **tax credits & rebates**

Cons

- + **Installation costs, considerations & processes vary**
- + Retrofit installations require **thoughtful planning & sequencing**
- + Poor installation results in **poor performance**