

# What's your R-value?

## Understanding how insulation performance impacts your building's energy performance



Adding insulation to walls and ceilings is one of the most effective ways to reduce energy costs and improve occupant comfort. But not all insulation upgrades deliver the same results. Understanding how insulation performance is measured can help you make smarter, more cost-effective decisions.

Insulation works by slowing heat transfer through three mechanisms: conduction, convection, and radiation. The better your insulation performs, the less your heating and cooling systems need to work to maintain a comfortable indoor environment.

### Insulation Performance Metrics: R-value vs. U-value

Two key metrics are used to evaluate insulation effectiveness:

**R-value (Resistance to heat flow)** measures how well a material resists heat transfer. The higher the R-value, the better the insulating performance. R-value depends on factors like material type, thickness, and density.

Commercial standards such as **ASHRAE 90.1** recommend roof insulation levels of approximately R-38 to R-60, and wall insulation ranging from R-13 to R-32, depending on climate.

**U-value (Rate of heat transfer)** represents how much heat passes through a material. The lower the U-value, the better the insulation's ability to prevent heat loss.

Together, these metrics provide a clearer picture of how insulation contributes to overall building efficiency.

### Improving Performance: Getting the Most from Your Upgrade

While increasing insulation levels improves efficiency, the benefits are not always linear. As insulation is added, the rate of energy savings begins to diminish.

**Assess existing insulation performance** before investing in upgrades.

**Prioritize areas with the greatest heat loss**, such as roofs and exterior walls.

**Ensure proper installation**, as gaps or compression can reduce effectiveness

### Beyond Insulation: Air Sealing Matters

Gaps around windows, doors, and building penetrations allow conditioned air to escape, increasing energy use and reducing comfort. Sealing these gaps with caulking and weatherstripping is a simple, cost-effective way to enhance insulation performance and improve overall building efficiency.

### Create Efficient and Comfortable Spaces

Upgrading insulation is a powerful step toward better building performance – but understanding how it works is key to maximizing your investment. By focusing on the right metrics and addressing air leakage, you can improve comfort while increasing energy efficiency.

For more information, visit: [ngrid.com/weatherization](https://ngrid.com/weatherization)