

Information on the differences of R-Values and Thermal Conductivity

What is an R value?

https://en.wikipedia.org/wiki/R-value_%28insulation%29

The R-value is a measure of thermal resistance, or ability of heat to transfer from hot to cold, through materials and assemblies of materials. The higher the R-value, the more a material prevents heat transfer. R-value depends on materials' resistance to heat conduction, as well as the thickness and any heat losses due to convection and radiative heat transfer. However it does not account for the radiative or convective properties of the material's surface, which may be an important factor for some applications. R varies with temperature but in construction it is common to treat it as being constant for a given material. It is closely related to the thermal transmittance of a material or assembly, but is easier to manipulate in some calculations since it can be simply added for materials and assemblies that are arranged in layers, or scaled proportionately if the thickness of a material changes. R-values expressed in United States customary units are about 5.67 times larger than those expressed in metric units.

What is thermal conductivity?

https://en.wikipedia.org/wiki/Thermal_conductivity

In physics, thermal conductivity is the property of a material to conduct heat. It is evaluated primarily in terms of Fourier's Law for heat conduction. Heat transfer occurs at a lower rate across materials of low thermal conductivity than across materials of high thermal conductivity. Correspondingly, materials of high thermal conductivity are widely used in heat sink applications and materials of low thermal conductivity are used as thermal insulation. The thermal conductivity of a material may depend on temperature. The reciprocal of thermal conductivity is called thermal resistivity.

Protecting the R-Value of Insulation

<http://www.dupont.com/products-and-services/construction-materials/building-envelope-systems/articles/protecting-r-value-of-insulation.html>

Tests have shown that, when outside air moves into the wall through any crack or crevice resulting from normal construction practices, the result can be up to 63% loss of the R-value of insulation.

Properly installed Tyvek® weather barriers create an air barrier system that reduces unwanted air flow and helps maintain insulation R-value, and keeps people more comfortable.

Maintaining R-Value by Resisting Water Intrusion

Wet conditions can dramatically reduce the effectiveness of insulation. Regardless of thickness, wet insulation retains less than 40% of its effective R-value.¹ Tyvek weather barriers resist bulk water penetration, helping to establish a tight building envelope to keep insulation dry. This helps wall insulation perform to its stated R-Value. At the same time, Tyvek® WB allows moisture vapor to pass through, to provide control of condensation in wall structures and reduce the risk of damage to insulation, as well as protect against mold, mildew and wood rot.

How does cork compare?

Cork does what Tyvek does on the outside of your home. Have you ever noticed that most building construction now has a house wrap on it? Older homes could benefit greatly from this application, but it's hard to apply a house wrap to old homes. However, it's possible to still create a thermal barrier on older homes with cork spray.

Cork is like wool

<http://www.thegreenage.co.uk/article/thermal-conductivity-r-values-and-u-values-simplified/>

Thermal Conductivity of insulating materials

Thermal conductivity, also known as Lambda (denoted by the Greek symbol λ), is the measure of how easily heat flows through a specific type of material, independent of the thickness of the material in question. The lower the thermal conductivity of a material, the better the thermal performance (i.e. the slower heat will move across a material). It is measured in Watts per Metre Kelvin (W/mK).

If you were to use sheep's wool to insulate your property it comes in at about 0.034 W/mK, about the same as most of the other wool and fiber insulating materials. Diasen cork spray comes in at about .086.