



## Cellulose, the Natural Choice for High Performance Green Building

Consumers and builders have many choices when it comes to what type of insulation to use in their new home. Cellulose, fiberglass, and foam insulations are the most readily available options. Insulation decisions are typically based on performance, value, and environmental aspects.

Your insulation choice not only includes its thermal performance (R-Value), but should also include its fire resistance, sound blocking capability and resistance to mold, insects, and vermin. In terms of thermal performance, R-value is not always the best indicator of how the insulation will perform in your home. R-values are measured in the laboratory and do not take into account the effects of wind and pressure differences within the home caused by the height of the home (Stack Effect) and mechanical systems such as dryers, range hoods, and heating and cooling equipment. When these pressures are coupled with the fact that homes are built from thousands of pieces of material, all with edges joints and gaps (i.e. holes), it means that air will try to move through and around your insulation. Insulation works by trapping air between its fibers or pores; it is this trapped air and not the wood or glass fiber that provides the resistance to heat flow. When air flows through or around your insulation, your insulation is not performing very well. Conventional fiberglass performs poorly, since air moves through it very easily, and batt insulation has unsealed edges and gaps no matter how well it is installed. When either foam is sprayed in, or cellulose insulation is sprayed into a wall assembly or injected dry, “dense packed” at densities of 3.5 pounds per cubic foot (lbs/cuft), it blocks this air movement by the density of the material and by leaving no gaps or joints for air to flow through, assuring consistent performance of R 3.8 per inch for cellulose. At these densities, the cellulose insulation will remain stable and in place for the life of the structure.

The other advantage for blocking air movement is that air accounts for over 98% of moisture movement; thus, if we block off the flow of air, we eliminate rot and damage and prolong the life of the structure. Cellulose insulation has been installed in millions of homes and buildings successfully since 1920’s without vapor barriers. The hygroscopic nature of the cellulose means that moisture can slowly diffuse through the material without accumulation or damage. Fiberglass insulation has no moisture storage capacity; moisture easily passes through fiberglass, condensing on the interior or exterior sheathing (depending on the season), causing deterioration of the structure.

A house fire is something we all want to avoid. In terms of fire resistance, cellulose insulation is superior to the other insulation options. Laboratory testing has shown that 14.5 inches of cellulose outperforms wood fire blocking. The boric acid fire retardants prevent flames from traveling through the cellulose and enhance the fire resistance of any assembly that cellulose is used in. Fiberglass insulation does not burn, but it melts when exposed to flame, allowing fire to spread very quickly. Foam insulation burns when exposed to fire and releases toxic smoke.

National Fiber's cellulose is the natural choice for insulation.



As buildings continue to be built in closer proximity and next to busy roads, the sound performance of your insulation becomes more important. Cellulose insulation offers the best sound blocking capability of any insulating material, due to its high density, air blocking ability, and vibration dampening qualities. In a 2 x 4 wall, cellulose achieves a sound transmission coefficient (STC) of 41, blocking out normal conversation and noise.

The boric acid fire retardants used in cellulose insulation also help repel insects and vermin, and additional boric acid based compounds, such as those used in our NuWool cellulose, are also EPA approved to resist mold. The boric acid is derived from naturally occurring borax and is permanently impregnated into the cellulose fibers.

The environmental aspects that are important in selecting your insulation include recycled content, embodied energy, and local production and manufacturing. Cellulose insulation is made from recycled newspaper and has a recycled content of over 82%. Fiberglass may have up to 25% recycled glass and foam insulation between 0 to 9% recycled content to its petrochemical formulation. The amount of energy that it takes to manufacture the insulation (embodied energy) also varies widely. Cellulose insulation is produced in regional manufacturing facilities using 750 btu/lb of material produced. Fiberglass takes 12,000 btu/lb to heat and process the glass while foam insulation uses 30,000 to 48,000 btu/lb to manufacture from petroleum based chemicals. Both are produced in large centralized manufacturing plants.

The value of your insulation depends not only on your initial cost, but also on what your insulation choice will cost over a period of time. Fiberglass has the lowest initial cost, but it will end up costing you more over time in higher heating/cooling bills and reduced comfort. Foam insulation has good thermal performance, but it has a much higher initial cost compared to the other options. Foam has its limitations in terms of sound attenuation and toxic smoke production and is not the environmental choice to make. The cost of cellulose insulation falls between fiberglass and foam, while exceeding both of them in terms of performance and environmental friendliness. Cellulose insulation is not only the green choice, but it is also the best choice when performance and comfort are desired.

If you have any questions or would like to discuss this further, please contact our Technical Manager, Bill Hulstrunk at [technical@nationalfiber.com](mailto:technical@nationalfiber.com).

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