

Insulation

In past years one of the most cost effective means of reducing heating bills, increasing the energy efficiency in buildings was to increase the level of insulation within the outside walls of the building. But what is insulation?

Insulation is a material that restricts or slows down the transfer of heat energy.

In a building two processes are involved when we consider heat energy transfer, conduction & convection. Radiation at this point is not considered as the heat radiation from a body turns to conduction when it reaches another body.

Metals are good conductors of heat so are not considered for insulation. Cork bark was used in the past as a flooring insulator as it was strong enough to withstand the weight placed upon it, but Cork was heavy because of this strength.

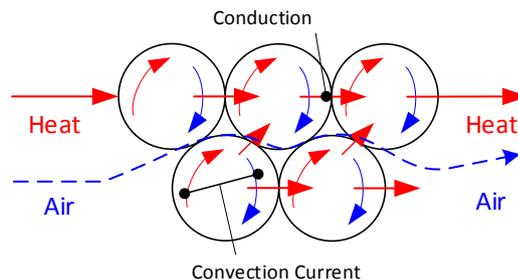
The best insulator as used for a long time & is still in use is air, but has the disadvantage of forming convection currents, & needs to be contained.

Dry air being better than damp or humid air for insulation.

Air that is kept still & prevented from forming convection currents is even better!

Tip: Keep the cavity walls (brick or block) dry to increase the insulation performance.

Insulation materials have developed over the years with improvements to the restriction of energy flow making the older types of insulation outdated.



Sketch: Showing insulation material & air convection currents with conduction paths

Today's modern insulation material is made up of very tiny bubbles of gas surrounded by extremely thin walls of plastic that restrict the conduction of heat energy. These materials are reasonably strong yet lightweight so are easy to use. They are currently the best economical way to restrict heat energy in today's world.

An insulation material that has also been around for a long time & is still in use is fibreglass as well as mineral wool & other natural fibrous materials.

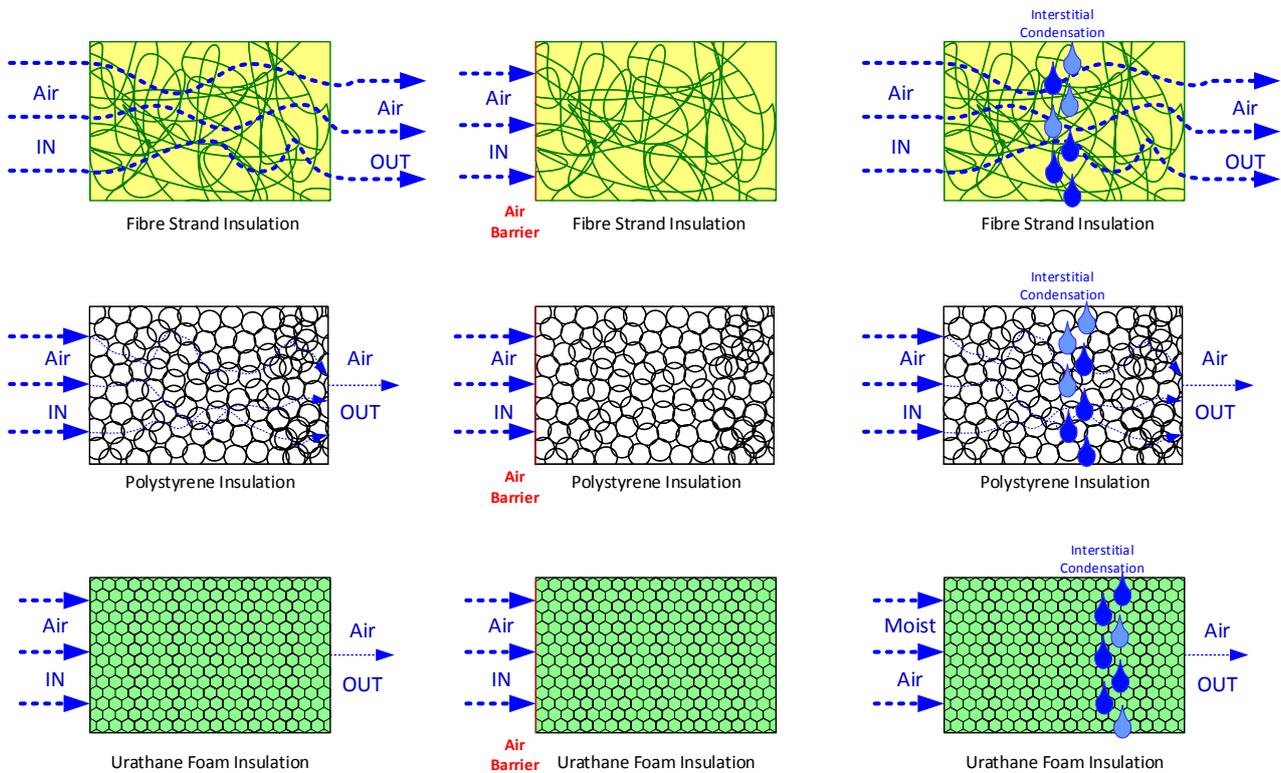
These fibrous materials have been used to insulate buildings for many years with changes to the structure of the material to improve the rigidity of the insulation.

The plastics used are generally easier to use while not causing irritation to the workers skin while working with the materials. However they are more expensive to buy than fibrous materials.

Fibrous materials have an advantage over plastics as they can be compacted during transport, unwrapped as installed fairly easily, especially when insulating an attic loft.

However, an insulation layer is only as effective as it is sealed. If the insulation is continuously exposed to air movement, this will lead to a significant reduction in performance.

For example, if one were to wear a woolly jumper on a cold windy day it will not insulate effectively, but if one were to wear a light windshield over the jumper, then it actually insulates effectively. Insulation in our homes is very similar.



Sketches showing air travel through different insulation materials

Currently adding more insulation to your property may not be the most economical way to improve the energy performance of your building, while adding insulation to walls & floors is sometimes not physically possible, adding insulation to the ceiling in the attic is fairly easy. However to improve the insulation performance of the current insulation is simple, find & seal the air leaks that are robbing heat energy from around the insulation.

The more air leaks the building has the more energy used to maintain the temperature, the more it costs!

To improve the energy performance of the current levels of insulation you need to stop or slow down any air movement that may be affecting your property.

By finding & stopping draughts (uncontrolled air movement) in your property you will improve your energy performance and notice a reduction in your heating bills.

When using any insulation material it must be fitted correctly, with no gaps around the edges and if building layers to increase thickness always stagger the joints, do not allow a direct passage from warm the side to the cold side. Prevent air from being driven over the outside surface of any fibrous insulation. Don't tuck roll fibreglass into vertical gaps between timber frames, it will slip down over time due to building vibrations, leaving a gap at the top with no insulation at all !

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