A Short Overview of Attic Insulation Considerations

Andy Walker, Jan 2022

The attic or loft is a crucial part of the thermal envelope of any house.

Heat rises within the house and so it is particularly important to ensure that the airflow is reduced and that there is adequate insulation in the attic space ie a low U value to be able to keep the heat and the warm air inside the living space

There are two options for insulating an attic space

The first is to insulate the horizontal surface of that space and leave the angled roof surface uninsulated. This is referred to as a **cold roof**

The other option is to insulate the inside surface of the sloping aspect of the roof and this not surprisingly, is called a **warm roof**.

It is far and away easier to insulate the horizontal surface of an attic space and unless there are intentions to extend the living space into the attic space, then this is the quicker, cheaper and easier option by far.

Dealing with air tightness first is very important

There are several paths through which air might flow from the living space up into the attic space.

Any warm air that escapes from the living space will be replaced by cold air entering the house - probably lower down. This will have the effect of cooling the house. Therefore, it's very important to make the upper surface of the living space as airtight as possible.

Some examples of where air can flow from the living space into the attic space include:

The **attic hatch** itself needs to be made highly draught proof. This can be done by ensuring that the lip that the hatch rests against is both flat and smooth. Then a draught strip can be fitted for the hatch to sit on. Alternatively a draught strip could be fitted from below as for an external door – which effectively it is.

The hatch could be made slightly heavier by fitting an additional wood panel on top so that it sits more firmly onto the draught strip. Catches could be added as well to ensure a tight fit.

There is very often air leakage around **light fittings** even if they are the regular pendant type.

It is worth adding sealant either from above or below to stop that airflow.

One very common route for air through light fittings is where the where there are **recessed lights**.

Very often these are dreadfully outdated halogen bulbs, and because of the extraordinary amount of heat which is generated by halogen bulbs there is very commonly no insulation placed above them because of the risk of overheating

Not only that there is usually significant airflow through the luminaire itself and into the attic space.

The recommendation I give to all of my customers is to remove recessed lights if possible and go back to regular pendant lights or wall lights. or at least replace the halogen bulb luminaires with shower fitting type luminaires with LED bulbs. The advantage of the shower fitting luminaires is that because they are designed to be waterproof they are of course inherently airtight as well.

In the attic space with a recessed light, even if it's an LED, there must still be an air gap created above the top of the light fitting.

The heat generated by LED bulbs is significantly less than that from halogen bulbs, but an air gap above them is still required.

A good way of doing this is to buy a simple fire hood from one of the DIY merchants (about £10) and sit this on top of the light fitting from above and then insulation can be packed around the fire hood and on top of it.

Another source of airflow from the living space into the attic space is around **pipes and wires** that go up into that space and where no effort has been made to create an airtight seal around those pipes and wires.

So with pipes the simple expedient of using Expanding Foam can very quickly create the necessary seal.

With wires, a small amount of silicone sealant just in the hole it passes through will be sufficient.

However for longer cable runs a little bit more consideration is needed because of the possibility of the wire overheating when it's buried within insulation.

This is particularly true of heavy current carrying cables. Like for example to an electric shower or even ring main cables.

Quite commonly cables supplying showers will run across parts of the attic floor and then down into the location of the shower itself.

An air gap has to be created around these cables to allow for dissipation of any excess heat when the cable is carrying a full load.

This can quite simply be achieved by fitting a conduit to the cable before insulation is piled around it.

The kind that can be used is 25 millimetre diameter flexible conduit available at many builders merchants. This can have a slit made down the size of the conduit and then fitted around the cable.

It's also possible to reuse old half round guttering to lay on top of the cable if it's in a reasonable place - say running between the ceiling joists - to create an air gap

Once the air gap has been created, then insulation can be fitted on top to any depth.

When considering how much insulation is sufficient it's important to have ambitious design targets

I recommend aiming at a U value of around 0.1 or less. This will create an excellent thermal barrier to reduce the amount of heat which is escaping from the living space into the attic space.

This can be achieved by having around a 400 millimetre depth of mineral wool in the attic space over the entire area.

Very commonly, some mineral wool / fibreglass / glass wool is already present in the attic laid between the ceiling joists - this can be left in place.

It's often a very old type, full of dust and perhaps other debris and would create an extraordinary mess if an attempt was made to move it - so just leave it alone and put additional insulation on the top

I most commonly use two layers of Knauf Earth Wool insulation at 200mm depth.

The binder that's used with this type of glass wool means that it is a lot less itchy-scratchy than many other types of fibrous insulation and so is therefore easier to handle - although a really good mask and gloves are still very necessary.

Image showing the two layers of 200mm glass wool

In this installation they are parallel to each other

The ideal pattern of installation of the mineral wool roll is with two layers of 200 millimetres one at right angles to the other.

Each roll must of course be fitted very tightly to its neighbour to ensure that there are no gaps that heat can leak through.

The finished insulation system

– note that there are no gaps between the rows of glass wool

The attic hatch itself must be insulated

If there is no intention to go into the attic space, once the space has been insulated, then the attic hatch can simply have a 400 millimetre bundle of glass wool sitting on top of it. Indeed, it could just be arranged that it will fold down from the rest of the attic insulation to create a continuous layer.

However, if the attic space is going to be used for storage, then the back of the loft hatch itself can be fitted with 200mm of Kingspan. PIR being the family name for all that type of rigid board insulation.

The insulation performance of 200 millimetres of PIR is equivalent to the insulation performance of 400 millimetres of mineral wall or glass wool.

This PIR layer should cover as much of the upper surface area of the attic hatch as possible.

Insulated attic hatch above a ladder

Floor hatch showing draught strip around the lip. For an attic hatch the insulation would be on the topside.

Storage in the attic

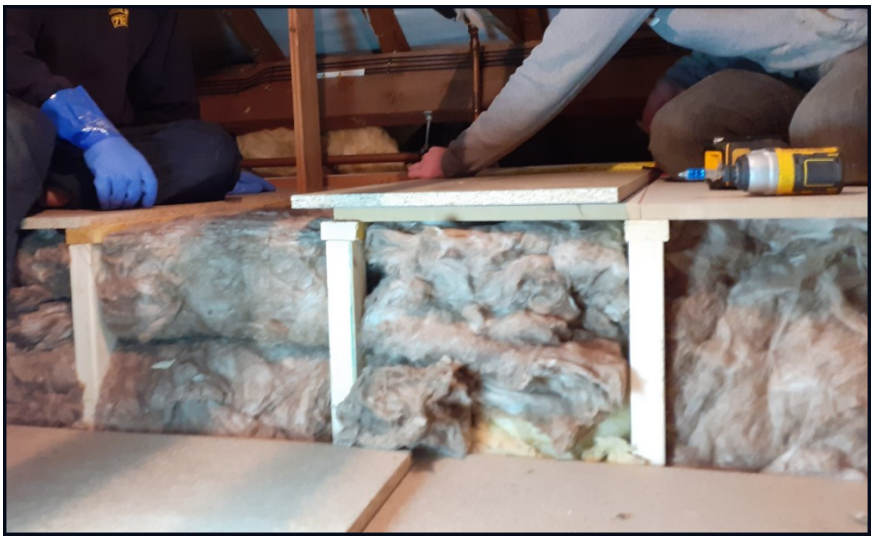
If there is a need to have at least part of the attic space used for storage, then prior to fitting the insulation layer it is necessary to build a storage platform.

First decide how much area of storage is really needed. It is often less than the complete area of the attic.

Then fit a series of 400 millimetre tall wooden uprights to the existing ceiling joists, perhaps with some horizontal members, as well. I usually space these uprights at 350mm intervals so that the 370mm wide rolls of glass wool insulation will fit snugly between them.
This will create the support structure for the storage platform which will be fitted later.

Once the vertical legs are fitted, then the insulation rolls can be fitted on the horizontal surface. And then finally, the boards can be fitted on to the framework that was created earlier.

Chipboard panelling with tongue & groove edges is a very convenient way of creating such a storage platform.



Thought must be made about the size of chipboard panels that are purchased because they do have to be taken up through the attic hatchway to be used.

If the storage platform is coming right up to the edge of the access way into the attic, then a vertical piece of boarding could be fitted to stop the mineral wool being in the way as people climb into the attic space to access the storage area

Air circulation within the attic

It is of course necessary to have sufficient air circulation within the attic to prevent moisture build-up on the timbers of the roof itself.

If a breathable membrane is fitted above the rafters and below the tiles, then this will be sufficient to allow any moist air to escape to the outside.

If there is no breather membrane, then the chances are there'll be sufficient air flowing between under the tiles to create an airflow across the attic space.

If however an impermeable sheet has been used below the tiles, common in some older houses, then extra attention must be paid to crating an air flow.

Often air enters the attic space at the soffit level. In other words, the junction between the vertical external walls and the sloping part of the roof – so it's important not to fill all of this space with mineral wool.

In addition, I often recommend the fitting of ridge vents to improve the air flow.

Plastic sheeting in the attic

The use of any kind of waterproof membrane or cardboard on the horizontal surface of the attic space is a really bad idea and should never be done. I have seen several examples where this has led to a considerable build up of condensation.

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