Action Surrey
SURREY'S LOW CARBON COMMUNITY

Loft Insulation

Up to a ¼ of all heat lost from a UK home can be through the loft*. Having the correct depth of loft insulation installed is a simple, cost effective and easy way to keep your home warm. Loft insulation helps to trap heat that rises up through the house towards to roof, acting as a woolly hat for your home. If you currently have no loft insulation and install the full 270mm, the recommended thickness for loft insulation, you could save up to £50-150 on your heating bills and reduce your CO_2 emissions by 200-800kg[1].

Loft insulation can be a relatively easy DIY job or it can be installed for you, for around £150.

If you have or are planning to insulate your loft you should ensure that you do not insulate directly beneath the water stores (hot and cold) blocking out the heat that prevents the water from freezing. You may want to consider insulating your cold water store tank and lag the pipe-work as an extra measure. When insulating your loft you also need to ensure an adequate airflow to your loft space (see the section on ventilation for more information). The insulation is typically made out of rock wool or glass fibre and comes in big rolls that can be simply laid down in between the roof joists. However, there are more ecologically friendly materials available for insulating lofts such as hemp insulation and sheep's wool, and recycled materials such as recycled newspaper and recycled plastic. Using the more ecologically sustainable material is not only good for the environment but also good for the household's inhabitants; materials such as hemp are grown in the UK without pesticide and offer a carbon negative, non-toxic solution to insulation.

Getting to know your loft

Before you can insulate your loft properly you need familiarize yourself with it. You will need to measure the existing levels of insulation and assess the state of your loft regarding contents and boarding. If you go into your loft

[1] EST website

and can still see the timber joists crossing the loft you will most likely need to top up your insulation. 270mm is now recommended as the optimum level of insulation thickness, this fills the space up to the top of the joists and then usually requires another layer of insulation to be laid over the top, covering the joists. Boards cannot be placed on top of the loft insulation as this will compress it, dramatically reducing its thermal performance (for loft storage solutions see 'Loft Storage').

Measuring the levels of existing insulation - take a ruler up to the loft space with you and slide it down the side of the timber joist until it reaches the ceiling board, then take the measurement. Whilst in your loft you should also check for gaps or areas that are missing insulation.

Loft insulation is subsidised by the government and is free if you are over 70 years of age and reduced by 50% for all other home owners. You can call the Woking Energy Advice Line for more information on having loft insulation installed in your home on 0800 783 2503.

Loft contents & storage

There are a number of solutions to enable you to retain your loft storage whilst upgrading the loft insulation.

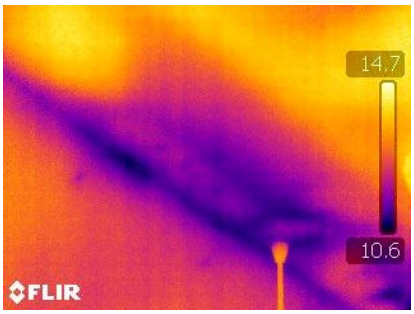
The easiest and most cost-effective solution would be to condense your loft contents as much as possible, purchase some rigid insulation board (space board, Celotex, Kingspan) or insulated loft boards (from B&Q or similar), lay the insulated loft board on top of the existing rafters and then lay the cheaper mineral wool around the area you have designated for storage.

Included in this guide is a detailed account from a homeowner who built their own suspended timber storage

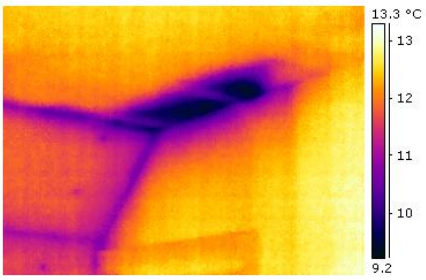
facility for their loft which incorporates 300mm of insulation. If you are online, click this link.

Oak Tree House Experience

When Oak Tree House was acquired there was an existing 50mm of loft insulation. This was upgraded to 300mm to increase the thermal performance of the roof. A thermal assessment of Oak Tree House highlighted the importance of an equal distribution of loft insulation. As can be seen from the photos below, heat was escaping through the ceiling close to the roof joists and other hard to reach places where loft insulation had not been laid properly or was not thick enough.



Both of these images show cold spots where loft insulation had not been laid properly at Oak Tree House.



These photos illustrate the importance of insulating evenly and thoroughly. Any areas that are neglected will be reducing your property's ability to retain its heat. It will also prevent you from achieving a nice stable comfortable temperature in your house. Research has shown that by having an area of just 5% of the loft space un-insulated can reduce the effectiveness of the rest of the loft insulation by 50-60%[2]. Increasing the loft insulation at Oak Tree House decreased the U-value from 0.57 W/m²K (watts per m² per unit of temperature difference measured in degrees Kelvin) to 0.11 W/m²K - the lower the U-value the less heat is able to pass through the material in question.

[2] Kingspan cite Taylor, B.E., Phillips A.J., *Thermal Transmission and Conductance of Roof Constructions Incorporating Fibrous Insulation*, ASTM STP 789

Topping up your loft insulation to 270mm can make a big improvement in reducing heat loss through the roof of your property. 270mm is the recommended thickness for loft insulation as it is close to optimum efficiency compared with the cost of installation. Figure 1 illustrates the thermal performance of mineral fibre in relation to thickness (mm). As the graph shows the improvements in the thermal performance of a ceiling by adding mineral wool begins to level off at a thickness of approximately 270-300mm. After this point the improvements in reducing heat loss are minimal and the investment would be better spent elsewhere.

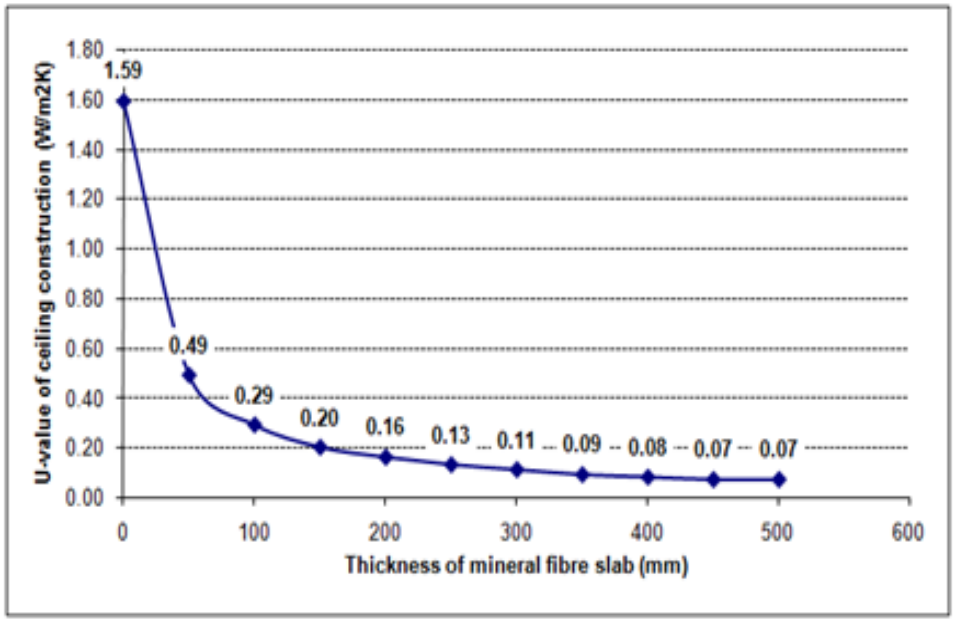


Figure 1 Thermal performance of mineral wool in relation to thickness.

IMPORTANT Ventilation is a key consideration when insulating your loft. Please see the section on ventilation to ensure you are aware of the requirements for ventilating a cold loft space.

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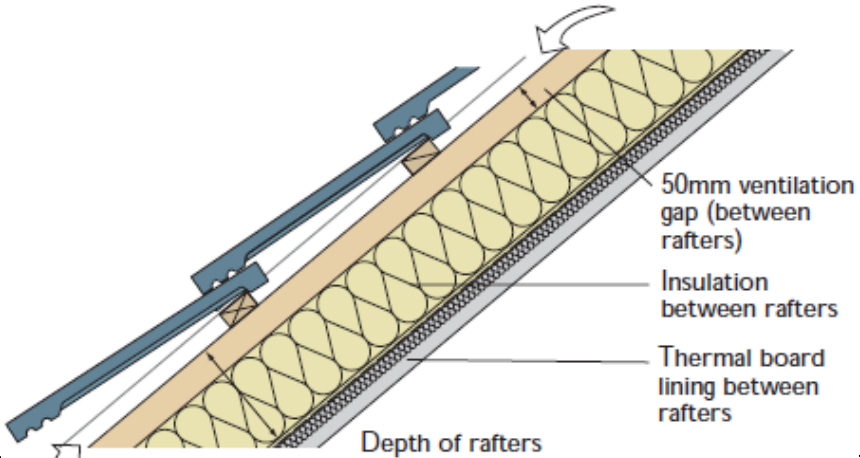
Converting the loft space or insulating a warm loft

Converting the loft space into a non-ventilated, warm loft space can offer an effective solution to insulating the top of your property and also makes use of valuable space in your home. Sealing the loft and using it as an additional warm living space eliminates the risk of condensation, and insulating at the rafters instead of the ceiling is also considered to be a more effective method of retaining heat eliminating cold bridges between the ceiling and the roof space. Insulating the loft space properly will not only keep it warm in the winter but also cool in the summer. If you are considering converting your loft space you will need to get Building Regulation approval. This can be sought from Woking's Building Control Department (01483 743841 or the FAQs on Woking's website). A converted roof space requires insulation between the rafters as opposed to the ceiling joists. Insulation that fills the spaces between the rafters is usually flexible and there are many materials to choose from (rock wool, recycled plastic, cellulose made from recycled paper, hemp, sheep's wool and others). This is then held in place ideally with insulated plaster board to provide an extra layer of insulation. Behind the flexible insulation a 50mm gap is required to ensure the rafters and counter-battens that hold the tiles in place do not suffer from condensation. This requirement is negated if breathable roofing felt is used under the tiles.

This diagram shows a ventilated pitched roof with insulation between the rafters supported by insulated plaster board (incorporating a 50mm wide ventilated cavity) Courtesy of EST. It is advisable to ensure that the plaster board placed on top of the rafters is insulated.



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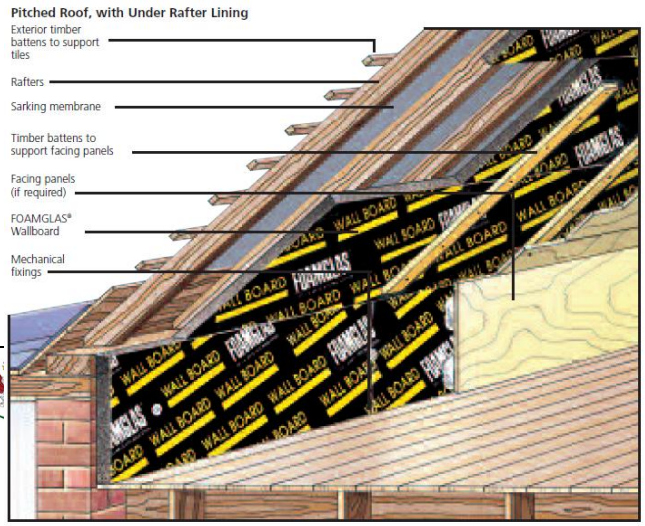
These diagrams (above) illustrate the 'thermal envelope' of a house with a warm loft space and a cold loft space

This diagram (Right) shows a rigid insulation board being fixed to the rafters before fixing further batons and then plywood. It is advisable to also have mineral wool in between the rafters before attaching insulation board. Image courtesy of FoamGlas

Building regulations (Approved Document L1B) currently require the roofs to loft conversions to achieve a U-value of 0.20W/m^{2}K. However, please check with Woking Borough Council's building control as these are due to be updated in early 2010.



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