Problems resulting from absent insulation

In one of the articles in the last edition of Green Building magazine Tony Cowling said that he would talk more about a family home that he visited during the DraughtBusters project. This home had lots of problems and his team returned there to undertake some thermal images of the problem areas. Here is what they found ...

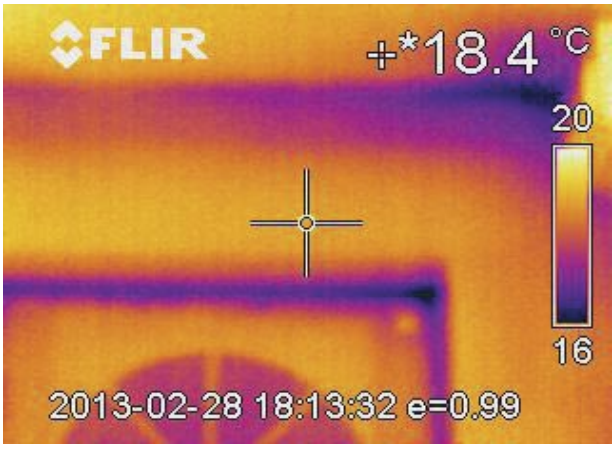
This is a story about a family who did everything right yet for them it had all gone horribly wrong. They have a shared equity scheme with a major housing association, which places all responsibilities for repairs and upkeep quite inequitably on the occupier. The householders have very prudently installed new windows, cavity insulation and had the loft insulation checked. The new windows upstairs didn't shut leaving horrible gaps which let in draughts and cold, the firm that installed them had gone bankrupt so trading standards couldn't help and litigation was pointless and would take too long and cost too much anyway. We arranged for new hinges to be fitted to solve the problem.

The cavity insulation caused problems in lots of odd places with condensation, damp and mould. This was as a result of the fact that it did its job in making the walls warmer where it was installed correctly but any part of any wall that was not insulated or any misses or gaps left the walls cold and problems resulted. A friend came and did a thermographic survey and we may publish this one day too. There are some more general issues with cavity insulation that concern me as it always stops at the top of the cavity, leaving an uninsulated section of wall between the soffit and the wall plate. I believe that this is in contravention of Part L1b of the Building Regulations.

The inspection of the loft insulation which reported that all was satisfactory was far from correct. For a start the loft trap through which the inspection was carried out had 5 to 10mm gaps each side and was itself uninsulated. The loft insulation was insufficiently thick and it could, at the time, have been topped up free under the government CERT scheme but bits were missing and it was not quite reaching the wall plate leaving the edge of the ceiling cold. These factors all combined to produce the perfect conditions for condensation and mould growth, resulting in very unhealthy living conditions. The family had done the right kind of things yet are living in some of the most appalling conditions that I have ever seen.

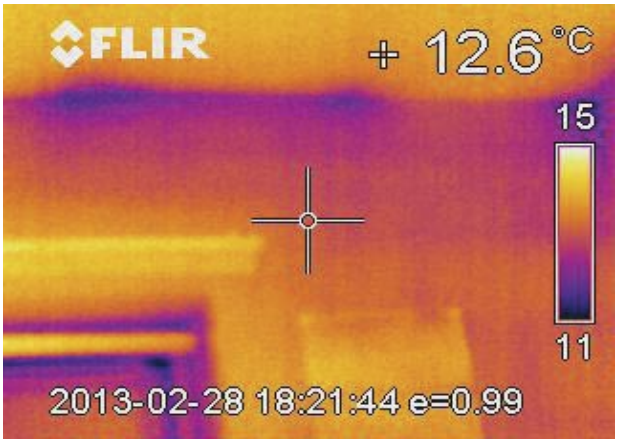
Let us now look at some of the problems with the assistance of both normal and thermographic images. On entering the property there was an external unheated large porch leading to the front door. Somewhat surprisingly there was evidence of both condensation and mould around the front door reveal and also at the wall ceiling junction, both of which were inside the porch and should have been slightly warmer (pictures 1 & 2). The damp on the ceiling was initially thought to be from a leaking shower, but above the front hallway there was only the third bedroom. The thermal image clearly shows cold bridging in the door reveal and highlights the area of mould at ceiling level as being very cold. We suspect that there is some missing cavity wall insulation at this point, possibly due to the presence of a damp tray and/or significant air leakage around joist ends.

In the lounge there were several cold damp patches on the ceiling edges and the external corner was very cold (pictures 3 & 4). At skirting level it was very cold too and in places there was again evidence of condensation and mould (see pictures 5 & 6). The householders were good and dried washing outside and even cooked with the back door open. The corner of the room, at floor level, is shown in picture 7, with a thermal image in picture 8; there is a lot

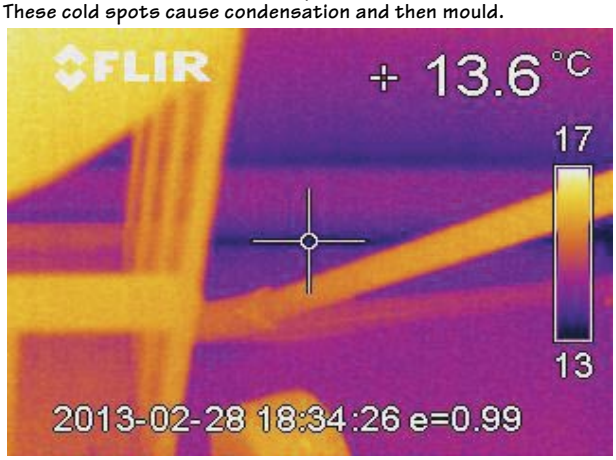


Pictures 1 and 2, even though the door was within a porch there were cold spots around the door and at the ceiling wall junction.

Pictures 3 and 4 indicating cold spots at ceiling and wall junctions.



Pictures 5 and 6 show the same problem at the skirting boards. These cold spots cause condensation and then mould.

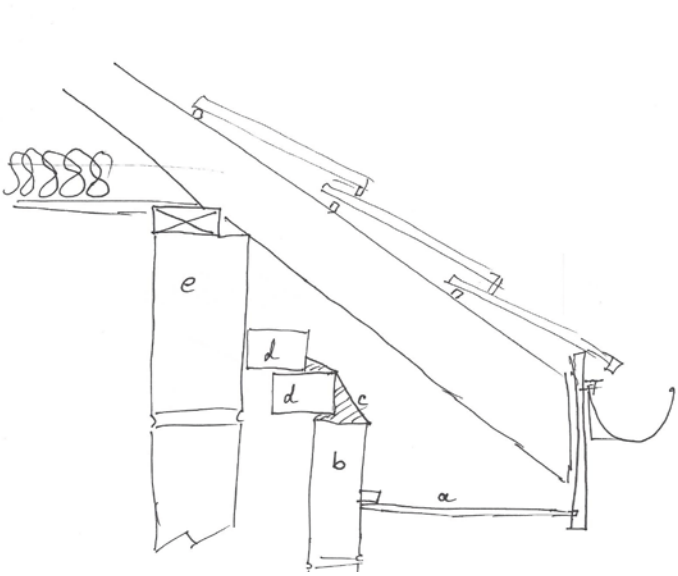


of cold coming in around the cable TV entry point, while the wall above the skirting was below dew point, seemingly a lot of the time. The family did admit that they could not afford to run the heating very often and they couldn't operate their thermostat as it seemed not to do anything.

The bedroom above the front hallway had evidence of mould and condensation at the edge of the ceiling and around the top of the outside wall. It is here that I will digress into the semantics of part L1b of the Building Regulations and its impact on cavity wall insulation. There is a huge difference between insulating a cavity and insulating the wall. Part L1b of the Building Regulations says that if more than 25% of a building element is insulated, then the whole element should be brought up to standard (or at the very least close to current requirements). Even though this is almost never done or enforced, nevertheless, for the family we are talking about, the difference between having insulated walls and insulated cavities is causing them big problems. Why should a cavity wall insulation company be exempt from insulating the top part of an inner skin wall between the top of the cavity and the wall plate - are they somehow exempt from the regulations?

Who is responsible for this area? This problem is compounded by the original construction, which, although carried out in the 1990s, has in-built thermal bridging where

Pictures 7 and 8 show that even socket entry points are cold spots. Corners are particularly vulnerable to mould growth.



Picture 10 showing the old fashioned roofing felt with inset pic showing the lack of insulation at the eaves.

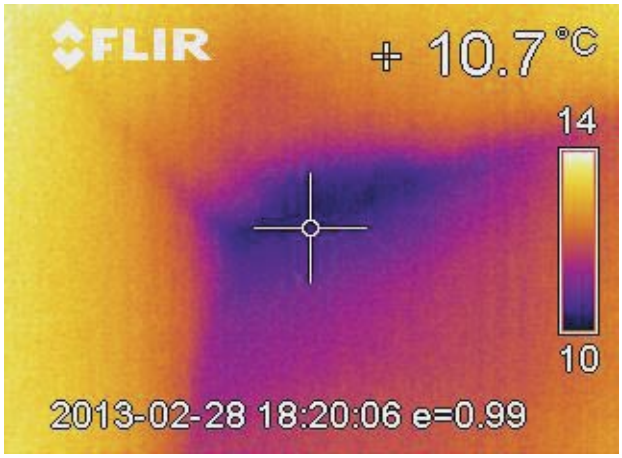
the cavity was closed at the top, in a rather old-fashioned way, see the diagram (above) . At the bottom of the picture (a) is the top face of the soffit board; (b) is the blockwork of the outside skin which is rendered below the soffit; (c) is flaunching to hold in place the bricks closing the top of the cavity (d). This is incredibly bad practice and causes thermal bridging, or would have done, had the inner block wall (e) been insulated! Above this block is the wall plate, and one would normally expect to see the edge of the loft insulation coming over it, or at the very least visible above it (refer to diagram). The photograph was taken lying down in the edge of the roof void holding the camera between the trusses over the wallplate and hoping for a reasonable picture of the top of the cavity wall insulation. Picture 10 shows the view from inside the loft. There are two points to note: (a) the wall plate is not insulated, (b) nor is the edge of the ceiling.

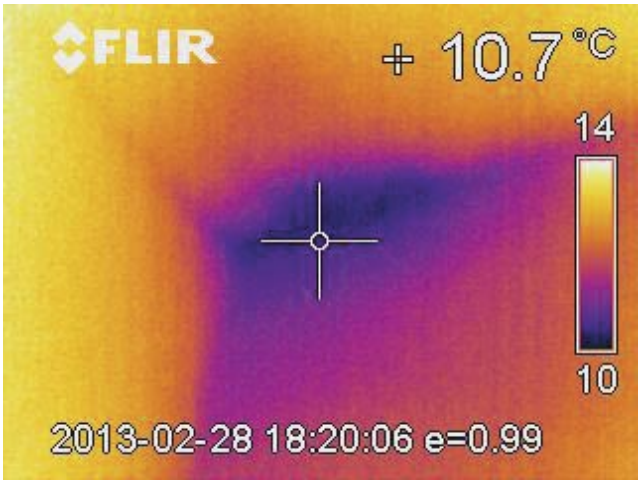
Bedroom two had similar problems and there was an unusual patch of mould in the centre of one half of the ceiling. On investigation we discovered that a small piece of insulation, a triangle 150mm x 200mm, was missing, so we replaced this with some spare that was lying in the loft. This demonstrates how important it is that insulation work is done carefully.

The main bedroom had problems around the top of the external walls and the ceiling edges, especially at the external corner. Picture 11 shows the condition; it looked much worse to the naked eye. From the thermal image it can be clearly seen that the top of the wall is much cooler than it is lower down, as it has no insulation at the top. It is also possible to see the thermal bridging effect of the mortar between the blocks, the darker lines in brick bond faintly visible in the thermal image (picture 12).

Picture 13 is a thermal image showing missing insulation at the ceiling edge, where an internal partition meets the external wall. Again there was mould growth exactly matching the cold patch, and, of course, missing insulation to the edge of the ceiling. tha causes of this can be seen in the picture above (inset) which shows the wallplate and ceiling edge. The clean patch on the ceiling is where I very slightly pulled back the insulation in order to take the photo. In my view the only way to insulate is before the roof sarking goes on. The process, therefore, is to build roof, affix a vapour/air tightness layer, tack ceiling, insulate, inspect for 'misses' and complete the insulation works over the wall plate area, leaving the required ventilation gap and

Pics 11 and 12 shows that the bedrooms beneath the roof space were really bad for condensation and mould at external corners





Picture 13 shows the heat loss where an internal partition meets the external wall.

Pictures 14 and 15 showing the significant heat loss paths at the corners of the seemingly well insulated windows.

ensuring that there is no thermal bridging or compromised U-values, then carry the insulation down to meet the wall or cavity insulation and, only then, felt and batten the roof. This should all be done in one day.

The window reveals had such bad thermal bridging immediately adjacent to the frames (pictures 14 and 15) that I removed a trim to satisfy myself that there weren't any gaps or cracks leading to outside. This showed that the windows had been generously siliconed in all around with no gaps, quite a nice filling and covering up job. This led me to assume that silicone is a good conductor of heat (and condensation surface) compared to plaster, thus causing the cold spots and mould round the frames. Evidence here suggests that the more plaster that fell off, the more silicone went on and the more cold bridges and black mould resulted. Should the trims be removed, the silicone cut out and a more insulating filler be used?

These problems are relatively minor compared with the cold bridging around the first floor ceilings on all the outside walls. I am proposing to try to insulate the area between the top of the cavity and the wall plate by taking down the soffit board, then carefully breaking out the flaunching and the bricks that close the cavity, then inspecting the cavity fill, which I am sure will have settled and is already known to be patchy; and finally to fit insulation between the cavity wall insulation and the loft insulation, leaving a ventilation gap between the insulation and the sarking above the wall plate. I am debating whether to involve building control in this or whether to just get on and do it. On balance, in the end I decided to put in an application, if only to formalise the problem and get it all recorded.

In conclusions, in the UK there are more and more people living in energy poverty, and far too many living in cold, damp and unhealthy conditions. The family discussed here are an extreme case, but many of the problems that we have seen are far more widespread than we would like to believe. Their house is modern yet it still harbours a plethora of issues related to poor building techniques, and the cost of remedying these is very high. The on-going cost of not fixing the problems is also high, especially in terms of health. Worse than this, none of the agencies that I contacted were in any way willing to help, building control said nothing and were not prepared to carry out any enforcement action, trading standards were helpful but couldn't do anything either, the housing association was worse than useless, although they did at least send a surveyor to take a look after repeatedly contacting them, and local charities were unwilling to help. What recourse is there for folk in this position, not able to help themselves and struggling with the disappointment of being stitched up by all around them? Answers on a postcard please!

Tony Cowling

Tony is a retired builder who lives in Reading. He graduated from Reading University in the seventies with a PhD in chemistry but his love of building soon developed into starting his own building company. As his final building project, Tony designed and built a house which has no heating system (or heating bills) yet remains a comfortable temperature throughout the year. Tony now has a small sustainability consultancy but spends much of his time assisting local charities and doing voluntary work this includes 'draughtbusting', he is keen on anything that saves energy or money. ANTONYCOWLING@GMAIL.COM