'Dot and dab'

'Dot and dab' is a technique that was developed to replace traditional wet plastering and it is now frequently used in new buildings. It became prevalent in England during the late seventies and quickly gained in popularity due to its lower costs, faster installation, quicker drying time and ease of finishing. Walls finished in this way can be painted almost immediately. Dry lining, as the process is known, is widely used by builders and developers and is particularly useful because it can be used on both wooden and masonry internal partitions and ceilings, as well as the outside walls. Despite its benefits 'dot and dab' is not without problems, and we will have to live with the consequences of these for generations to come. Tony Cowling discusses the shortcomings of the method ...

The ability of plasterboard to be directly attached to masonry using dots and dabs of adhesive gives a considerable speed advantage over the wet plastering which was formerly exclusively used. Wet plastering is a traditional trade that requires a high level of skill, takes longer and needs more drying out time and all of these issues make conventional plastering more expensive and far less common nowadays.

The downside of 'dot and dab'

Let us look at some of the down sides to the speed and apparent efficiency of dot and dab. Block work walls are generally built by bricklayers 'on a price' and as a result they are of a less than perfect construction, with frequent gaps and cracks that remain unfilled. These are then covered over by the plasterboard linings. When dot and dab was first introduced, cavity walls were well established but cavity fill was almost unheard of for new build. All these cracks and gaps allow outdoor air to whistle around behind the linings, cooling them and the home they were part of. In the worst cases there is so much thermal bypass, as it's known, that the householders were effectively living in plasterboard tents. Energy was cheap and plentiful and insulation levels were very low in those days.

More recently best practice dictated additional measures should be used when dry lining. There was a requirement to use full ribbons of adhesive around the perimeter of each wall to try and prevent the worst of the problems mentioned above. However, the tradesmen, again, were generally on a price and as this method takes longer and uses more materials it was rarely done in this way. It is almost impossible to find any of these ribbons, but they will show up on thermal imaging, though I have never yet seen any. Adherence to the technique is very difficult to validate and so, in reality, it tends not to happen. It would seem that someone realised this and decided to ask for the block work to be sealed with a parge coat before the linings are applied. Again this is rarely seen in practice.

On top of this there is typically a gap left at the bottom of the wall, which allows draughts to enter the rooms. A search of the web will reveal that neither parging nor ribbons of adhesive have a place in our thinking, even now. Recently air tightness testing of new homes has been introduced, but unfortunately a room or even a whole house can be reasonably air tight yet still have all the problems already highlighted above. The recommendation that the skirting boards should be sealed to the floor is questionable, even though it is one of the so called 'robust details'. Others include sealing all internal visible cracks and gaps to give an airtightness layer inside the home, yet outdoor air is still able to waft around behind the linings and inside the insulation barrier.

Why I started looking into these problems

I started writing this paper in March 2013 after a diligent home owner discovered that warm air was emanating from gaps behind his plasterboard linings and leaking into his loft. The story got worse when it was discovered that cold air could travel from under the suspended concrete ground floor up the back of the ground floor wall linings and into the first floor void. From there it could continue on up behind the first floor linings, being joined on its way by cold air coming in from outside, through many cracks and gaps. There were lots of these around the first floor joist ends, and also between the blocks that were used to infill between the joists. Shrinkage and movement of the joists magnified the problem (see pictures top right next page). Many people may not notice this air movement which, even on still days, is driven by convection currents. However, you may have noticed draughts emanating from electrical socket outlets or perhaps you will do now! Most homes have these convection currents to a limited extent, even those that have been wet plastered.

Thermal bypass

Having discovered that air was circulating behind the linings, a spot temperature survey of the main bedroom was performed. It revealed that there was an eleven degree temperature gradient between the bottom of the

Building works are rarely properly sealed off behind dot and dab dry walling as the pictures here indicate.

walls and the top. The bedroom was partly above a garage but the floor had been well insulated. The bottoms of the walls were thought to be below dew point, at least some of the time. There were some areas, mainly in the corners of window reveals, where mould was evident. The main reason that there was no condensation at skirting level was because it was so draughty down there that even if droplets did form, which was unlikely, they would evaporate away again, almost immediately, as the drier outside air passed over them stirring and mixing with the warmer air in the room. Not only were the draughts moving behind the linings but they were coming out under skirtings, even on internal walls, through down lighter holes on the ground floor ceilings, round pipes, out of switches and even from behind architraves. The owner has described his house as 'a colander' on several occasions.

It was also noticed during the temperature survey that the window reveals were a lot cooler than the walls nearby. The owner eventually decided to bite the bullet and removed a strip of plasterboard adjacent to a window to see what was behind it (see picture top right). Horror of horrors, more holes, a wavy plastic damp proof course, with gaps both sides of it, allowing draughts easy access. This vertical dpc could have allowed damp onto the plasterboard lining had the construction been more airtight. Bricks, instead of blocks, had been used to close the cavity. These would normally have caused thermal bridging had there not been so much thermal bypass going on. The bricks can just be made out even though the builders have tried to disguise them with mortar.

Extensions

Most houses get altered and extended during their lifetime and this house was no exception, although hopefully the way that it was carried out was not typical. The extension to the lounge involved demolishing the old rear wall and supporting the upstairs walls on steel beams. These beams were above ceiling level and there were gaps over, under, through and around them. The new ventilated roof of the extension connected to the ceiling void of the lounge (see Fig 1, next page). There were so many air paths between outside and inside in this area that we gave up counting them.

How to set about rectifications

All this is very disappointing but some encouragement can be taken from the fact that there are plenty of remedial actions that can be considered. Cold comfort can also be taken from the fact that there are probably hundreds of thousands of others in this same predicament struggling with high energy bills.

Remedial action to walls

The brute force approach would be to rip off all the linings and wet plaster the whole house. However, this would be

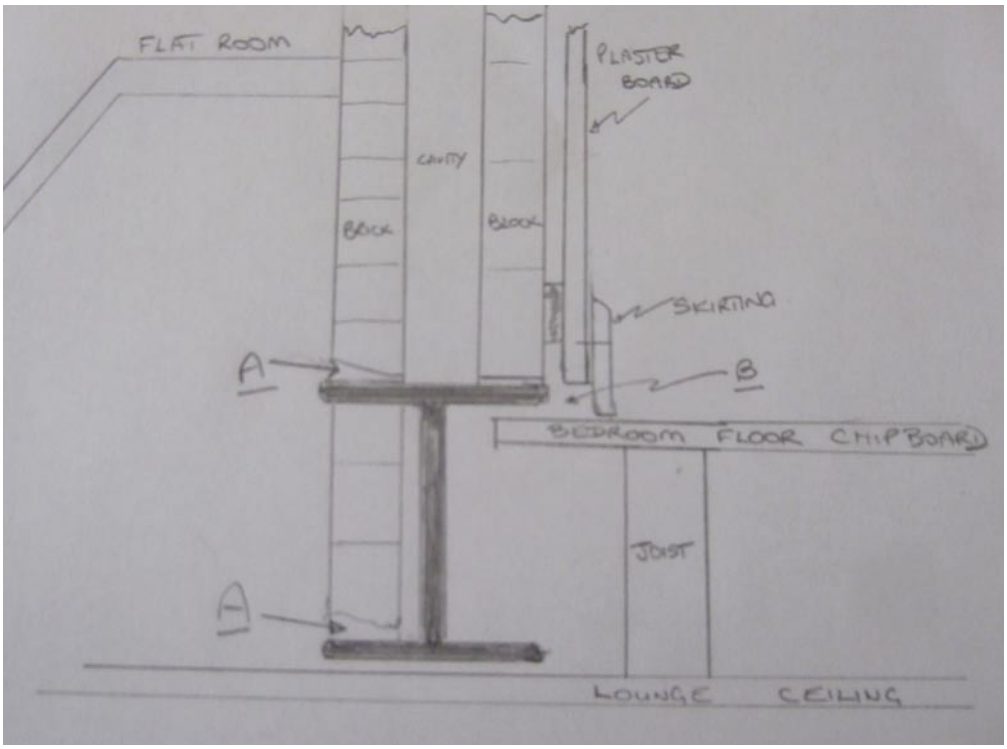

Fig. 1. For this property extension a new RSJ had been installed between the extension roof and the existing lounge ceiling. Unfortunately the new 'ventilated' roof of the extension connected to the ceiling void of the lounge, which allowed for the unhindered movement of cold air from the loft to the rest of the house.

disruptive and expensive and the floor void would remain a problem. Re-plastering like this has been done many times and is the only certain way to deal with the problem, but is only practical at the time of major renovations.

Remedial actions

The following suggestions are intended to help those who want to try to improve the airtightness of their home and are on a tight budget.

Skirting boards and linings

A good first step would be to seal the gaps at the bottom of the walls. This could be done by removing the skirting boards and fully foaming the gap between the bottom of the plaster board and the wall. A further action would be to similarly seal the gaps at the top of all the ground floor walls and those at the top of the first floor walls too. This would still leave the air ingress in the floor void as the biggest unresolved issue, but technically this is not a fault originating from blob and dob since it is generic to all cavity wall houses. That is with the exception of Tony's house and Denby Dale see: http://www.tonyshouse.cowlings.org.uk/tony.htm and http://passivesite.blogspot.co.uk/2011/08/denby-dale-passive-house-in-3d.html.

Problems would still exist behind the linings but their effect would have been significantly reduced if, and only if, there were no longer air paths between the voids behind the plasterboard and any part of the inside of the house or flat. We cannot emphasise how important it is that the void is completely sealed and that no draughts can possibly emanate from this area. A more comprehensive solution would be to develop a system that could be used to fill this void. One idea would be to use a low viscosity delayed setting foam. The development of such a solution would be technically difficult, because it would need to accommodate voids that are quite variable in nature. It would also need to take account of holes leading into the cavity or other enclosed spaces that are significantly larger than the voids themselves. There could be problems with clogging, over pressuring and blockages. Additionally foam might escape into the foundations, under-crofts or even manholes or drains, as well as into service ducts or electrical equipment and fittings, so these would all need to be considered and preventative measures taken.

Floor void

How do we seal up all the air leakages between the ground floor ceiling and the first floor boards? This is a true labour of love and only a few will be brave enough to take it on and even these will need good strong resolve to see it through. It will be worth it. Where does one even start and what techniques are at our disposal? On removing any skirting upstairs it will become immediately apparent that there are problems. Draughts will be easy to feel and see. Gaps can be observed sometimes right into the cavity, and fingers can be pushed into the gap between the plasterboard and the block work. Gaps, whether visible or not, will be present around the joist, where they enter the outside walls. These must be filled and because rodents can chew through foam, the best material for this is mortar. It is not possible to do this without taking up flooring sheets or floor boards. (see picture right). Once the first floor skirting and a floor board have been removed there will now be relatively easy access to the top of the ground floor wall/ceiling junction.

It is a good opportunity to seal this and foam can be used this time. Once good access is available we strongly recommend sealing all the outside wall masonry between the ceiling and the floor. Several approaches to this are possible: plastering it, fully buttering a suitably sized piece of board with bonding plaster or even with fixing foam and sticking it to the wall (see picture right) and sealing round it with foam. The sealing should continue up behind the first floor plasterboard lining to ensure that no draughts can get either into or out of the void behind the linings.

Fully 'buttering' a suitable sized piece of board with bonding plaster or even with fixing foam and sticking it to the wall can be suitable for sealing gaps in the floor void walls.

The junction of the exterior wall with the first floor ceiling

This junction is difficult to access and is best accessed whilst lying on a plank in the eaves of the loft having pulled back the insulation. It should be possible to see the gap between the wall or wall plate and the ceiling plasterboard. In dot and dabbed homes there is usually a gap big enough to almost see down between the edge of the ceiling and the wall plate or block work. It is easier to see on gable walls and any gap, no matter how small, will be bad news. It should be sealed and made fully air tight and again foam is a good product to use for this. There are two types of foam available, expanding foam and fixing foam. The latter does not swell up after application. Problems can arise when expanding foam is used and too much accidentally gets behind plasterboard as it can deform it and, for this reason, we generally use filling foam. This join in the loft is one where expanding foam can be used, but only use it with great care.

Window reveals

These, as we have already explained, have a plethora of problems; thermal bridging, air infiltration, misplaced damp courses and often large holes are present leading into the roof void, cavity or even into the eaves' box. Inappropriate materials and poor workmanship are all too common and, in concert with dot and dab, are difficult to deal with. Injecting perfect amounts of foam through a set of holes all around the reveal might be the least disruptive solution to a difficult problem, but it will not be easy to check how effectively the rectification has worked. Removing the plasterboard reveals and lifting window boards will allow inspection of all the problems and is the best way forward around openings.

The only way to do it cheaply is to do it yourself. This will be a big undertaking and will be time consuming, disruptive and messy. However, none of us are incapable of making progress towards air tightness. It is possible to start by removing just one piece of skirting and make progress from there. Finding trades' people with the requisite skills is both difficult and time consuming. None the less such an investment would repay itself fairly quickly, comfort levels will suddenly improve and energy bills should go down.

What about all the air leakages behind the linings? Well once wind or air can no longer find its way into the house it is far less of a problem. There will still be convection currents but their effect will be orders of magnitude smaller than those due to draughts. There is a bellow's effect on windy days, that will be pulling warm air out from behind the linings and in the next pressure change forcing some cold air back in. Without foam in the cavity of the wall or wet plastering (or the hoped for foam between the lining and blocks) this process will continue, but as long as air is not entering the home, though far from ideal, it is liveable with and we reiterate how important it is to air seal everything really well.

Internal walls

Where internal walls abut outside walls it is very likely that air can get from behind the plasterboard on the outside wall to behind the plasterboard on any masonry internal wall. From there it will have a general cooling effect and will try to escape into the building under the skirting, through sockets and switches and even from behind or over architraves, door linings even around pipes. The best place

to seal these is at the point of abutment, but this is by no means easy so it may be as well to seal all the possible exit routes. One good thing is that generally the floor boarding upstairs and the ceilings are fixed before the partitions are built, but if the walls are load bearing then there could be a gap leading into the loft, sadly on the ground floor. If they are solid walls, there will often be gaps at the edge of the ceilings allowing air to get from outside walls via internal walls and into the floor void and the places mentioned above.

Socket outlets

As we have pointed out already these are often a source of fairly severe draughts. The draughts can be stopped in several ways: seal the back box fully all around and seal the wire entry points with acrylic sealant; foam round the box and seal the wire entry points with sealant; fit a polythene or proprietary draught pouch behind the socket box and seal this to the lining; or use some other form of sealing. Sometimes plastic child safe covers are used to prevent draughts but these will not stop draughts coming out around the face plate itself and neither will they be fully airtight themselves.

Pipes and wires

These problems are not isolated to the types of homes we are discussing but are problems in all buildings. Mains gas, water, drains, electricity and communications' wires are often in sleeves or ducts and these can bring in draughts both round the duct as well as between the services and the duct. Cable entries to ceiling fittings can allow draughts to enter and these can be safely sealed with acrylic sealant. In new homes, or on rewiring, this should be done routinely now. Waste pipes, where they pass through walls or floors, can be draughty too and pipe casings, especially soil pipe boxes may require special attention at both floor and ceiling levels.

Conclusions

There are far too many homes in the country suffering from the problems we have discussed and we cannot see any reason why we should not return to wet plastering for finishing walls, especially as, despite having repeatedly tried to fix the problem, it is still the norm to find a lot of draughtiness associated with dot and dabbed homes.

For these reasons we tend to call this appalling system 'blob and dob' as it more closely expresses our negative feelings about it. It should be noted that neither the requirements for parging, which does nothing to stop one half of the problems, thermal bypass, nor the ones requiring the use of ribbons of adhesive, have had any significant impact in the real world, with too many people living in nothing more than plasterboard tents as a result. These problems have been known about for far too long now and despite this we as a nation are losing vast amounts

Cable runs and entries can allow draughts to enter and circulate. These can be safely sealed with acrylic sealant. In new homes or on rewiring this should be done routinely.

of energy simply because these measures have not and won't be effective.

Recommendations

It our recommendation that this technique should be outlawed in order for us to save energy, and it should be noted that energy saving is one of the present government's targeted measures. The air tightness issues which we have highlighted, where a room or house can apparently be air tight, yet the insulation outside this air tight barrier is bypassed by cold air rendering the insulation ineffective, is another good a reason to outlaw the technique, especially if we are at all serious about air tightness. Perhaps builders and developers should be responsible for the additional costs of energy that is a direct result of their omissions - this would make an interesting legal action, which could be taken against architects, supervisors and inspectors too! Where a home performs very much worse in practice than it does in theory why should the householder bear this cost? I hope that many of us will attend to the draughts in our own homes before next winter.

Tony Cowling

I would like to thank 'Andyman' from the Green Building Forum for his input into this article, help with editing and for allowing the use of his pictures.

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, including draughtbusting, He is keen on anything that saves energy or money.
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